US011502458B2

(12) **United States Patent**
Song et al.

(10) **Patent No.: US 11,502,458 B2**
(45) **Date of Patent: Nov. 15, 2022**

---

(54) **BACKPLANE CONNECTOR ASSEMBLY WITH IMPROVED SHIELDING EFFECT**

(71) Applicant: **DONGGUAN LUXSHARE TECHNOLOGIES CO., LTD**, Dongguan (CN)

(72) Inventors: **Tao Song**, Dongguan (CN); **Kun Liu**, Dongguan (CN); **Rongzhe Guo**, Dongguan (CN); **Chuanqi Gong**, Dongguan (CN); **Xiaogang Liu**, Dongguan (CN); **Ming Li**, Dongguan (CN)

(73) Assignee: **DONGGUAN LUXSHARE TECHNOLOGIES CO., LTD**, Dongguan (CN)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 43 days.

(21) Appl. No.: **17/334,014**

(22) Filed: **May 28, 2021**

(65) **Prior Publication Data**

US 2021/0399472 A1 Dec. 23, 2021

(30) **Foreign Application Priority Data**

Jun. 19, 2020 (CN) 202010567796.4
Jul. 22, 2020 (CN) 202010709127.6

(51) **Int. Cl.**
H01R 4/66 (2006.01)
H01R 13/6471 (2011.01)
(Continued)

(52) **U.S. Cl.**
CPC ***H01R 13/6471*** (2013.01); ***H01R 12/585*** (2013.01); ***H01R 12/716*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC .. H01R 12/585; H01R 12/716; H01R 12/724; H01R 12/71; H01R 13/6471;
(Continued)

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,601,527	A	7/1986	Lemke
5,664,968	A	9/1997	Mickievicz

(Continued)

FOREIGN PATENT DOCUMENTS

CA	2682605	Y	3/2005
CN	1244959	A	2/2000

(Continued)

OTHER PUBLICATIONS

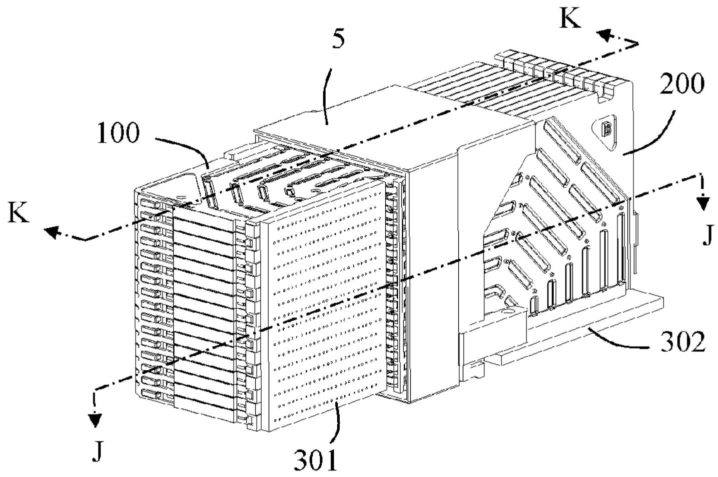
Office Action issued in Chinese Patent Application No. 202010709127.6, dated Mar. 26, 2021.

(Continued)

Primary Examiner — Khiem M Nguyen
(74) *Attorney, Agent, or Firm* — Birch, Stewart, Kolasch & Birch, LLP

(57) **ABSTRACT**

A backplane connector assembly includes a first backplane connector and a second backplane connector. The first backplane connector includes a number of first conductive terminals, a first insulating frame, a first metal shield and a second metal shield. The first metal shield includes a first elastic piece, and the second metal shield includes a second elastic piece. The second backplane connector includes a number of second differential signal terminals, an insulating block sleeved on the second differential signal terminals, and a metal shell sleeved on the insulating block. When the first backplane connector is mated with the second backplane connector, the first elastic piece and the second elastic piece
(Continued)



are in contact with the metal shell to increase the grounding shielding area, reduce crosstalk and improve the quality of signal transmission.

14 Claims, 44 Drawing Sheets

(51) **Int. Cl.**

H01R 13/40	(2006.01)
H01R 13/6587	(2011.01)
H01R 13/6591	(2011.01)
H01R 13/514	(2006.01)
H01R 13/518	(2006.01)
H01R 12/72	(2011.01)
H01R 13/6586	(2011.01)
H01R 12/58	(2011.01)
H05K 1/11	(2006.01)
H01R 13/6588	(2011.01)
H01R 13/6583	(2011.01)
H01R 13/6585	(2011.01)
H01R 13/6582	(2011.01)
H01R 43/24	(2006.01)
H01R 12/71	(2011.01)
H01R 13/20	(2006.01)
H01R 13/504	(2006.01)
H01R 13/6461	(2011.01)
H01R 13/6584	(2011.01)
H01R 13/6474	(2011.01)

(52) **U.S. Cl.**

CPC ***H01R 12/724*** (2013.01); ***H01R 13/20*** (2013.01); ***H01R 13/40*** (2013.01); ***H01R 13/504*** (2013.01); ***H01R 13/514*** (2013.01); ***H01R 13/518*** (2013.01); ***H01R 13/6461*** (2013.01); ***H01R 13/6582*** (2013.01); ***H01R 13/6583*** (2013.01); ***H01R 13/6584*** (2013.01); ***H01R 13/6585*** (2013.01); ***H01R 13/6586*** (2013.01); ***H01R 13/6587*** (2013.01); ***H01R 13/6588*** (2013.01); ***H01R 13/6591*** (2013.01); ***H01R 43/24*** (2013.01); ***H05K 1/115*** (2013.01); *H01R 12/71* (2013.01); *H01R 13/6474* (2013.01)

(58) **Field of Classification Search**

CPC H01R 13/6474; H01R 13/6591; H01R 13/6588; H01R 13/6587; H01R 13/6586; H01R 13/6585; H01R 13/6584; H01R 13/6583; H01R 13/6582; H01R 13/6461; H01R 13/518; H01R 13/514; H01R 13/504; H01R 13/40; H01R 13/20; H01R 43/24; H05K 1/115

USPC 439/108, 701

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

9,350,126	B2	5/2016	Little et al.
2004/0043658	A1	3/2004	Ko
2004/0229510	A1	11/2004	Lloyd et al.
2007/0155239	A1	7/2007	Nakada
2008/0014798	A1	1/2008	Pan
2013/0203273	A1	8/2013	Rathburn
2014/0051295	A1	2/2014	Westman et al.
2014/0248796	A1	9/2014	Pan
2014/0295705	A1	10/2014	Lee et al.
2015/0194771	A1	7/2015	Pan
2015/0303618	A1	10/2015	Lee et al.
2015/0318642	A1	11/2015	Lee et al.
2016/0093985	A1	3/2016	Zhang et al.
2016/0322760	A1	11/2016	Long et al.
2018/0166828	A1	6/2018	Gailus

FOREIGN PATENT DOCUMENTS

CN	2513252	Y	9/2002
CN	2571026	Y	9/2003
CN	1491465	A	4/2004
CN	1592990	A	3/2005
CN	101159354	A	4/2008
CN	201142392	Y	10/2008
CN	101330172	A	12/2008
CN	101527409	A	9/2009
CN	101542640	A	9/2009
CN	101728667	A	6/2010
CN	101459299	B	11/2010
CN	102088148	A	6/2011
CN	102290653	A	12/2011
CN	102468562	A	5/2012
CN	202395246	U	8/2012
CN	102694308	A	9/2012
CN	102969621	A	3/2013
CN	103151650	A	6/2013
CN	103247918	A	8/2013
CN	103296546	A	9/2013
CN	103311746	A	9/2013
CN	203589266	U	5/2014
CN	103928795	A	7/2014
CN	103988371	A	8/2014
CN	104037551	A	9/2014
CN	104241975	A	12/2014
CN	104396095	A	3/2015
CN	104505678	A	4/2015
CN	104577406	A	4/2015
CN	204304028	U	4/2015
CN	104779487	A	7/2015
CN	104810657	A	7/2015
CN	105024230	A	11/2015
CN	105470679	A	4/2016
CN	105470732	A	4/2016
CN	105470736	A	4/2016
CN	105612664	A	5/2016
CN	105703159	A	6/2016
CN	105742854	A	7/2016
CN	105958245	A	9/2016
CN	106207569	A	12/2016
CN	205846279	U	12/2016
CN	107104329	A	8/2017
CN	104009303	B	1/2018
CN	107565279	A	1/2018
CN	207530119	U	6/2018
CN	109390806	A	2/2019
CN	109546384	A	3/2019
CN	109546388	A	3/2019
CN	109586086	A	4/2019
CN	109599724	A	4/2019
CN	109659726	A	4/2019
CN	109841981	A	6/2019
CN	109950721	A	6/2019
CN	208955335	U	6/2019
CN	209056665	U	7/2019
CN	110185448	A	8/2019
CN	110247233	A	9/2019
CN	110299649	A	10/2019
CN	110323622	A	10/2019
CN	110544850	A	12/2019
CN	110600943	A	12/2019
CN	110649407	A	1/2020
CN	110718815	A	1/2020
CN	110808499	A	2/2020
CN	110838635	A	2/2020
CN	111092342	A	5/2020
CN	111370890	A	7/2020
CN	111682366	A	9/2020
JP	2000-058172	A	2/2000
TW	415133	B	12/2000
TW	459428	B	10/2001

(56) References Cited

FOREIGN PATENT DOCUMENTS

TW	M461166	U1	9/2013
TW	I414111	B	11/2013
TW	I452767	B	9/2014
TW	I545845	B	8/2016
TW	201733225	A	9/2017
TW	I600231	B	9/2017
TW	I528659	B	4/2018
TW	I623154	B	5/2018
TW	201841440	A	11/2018
TW	I648925	B	1/2019
TW	M585436	U	10/2019
TW	201943158	A	11/2019
TW	M591270	U	2/2020
TW	M593091	U	4/2020
WO	WO 2016/168820	A1	10/2016
WO	WO 2017/106266	A1	6/2017

OTHER PUBLICATIONS

Office Action issued in Chinese Patent Application No. 202010709180.6, dated Mar. 30, 2021.

Office Action issued in Chinese Patent Application No. 202010710402.6, dated Mar. 3, 2021.

Office Action issued in Chinese Patent Application No. 202010710463.2, dated Mar. 25, 2021.

Office Action issued in Chinese Patent Application No. 202010931721.X, dated Mar. 25, 2021.

Office Action issued in Taiwanese Patent Application No. 109128295, dated Apr. 14, 2021.

Office Action issued in Taiwanese Patent Application No. 109129938, dated Apr. 15, 2021.

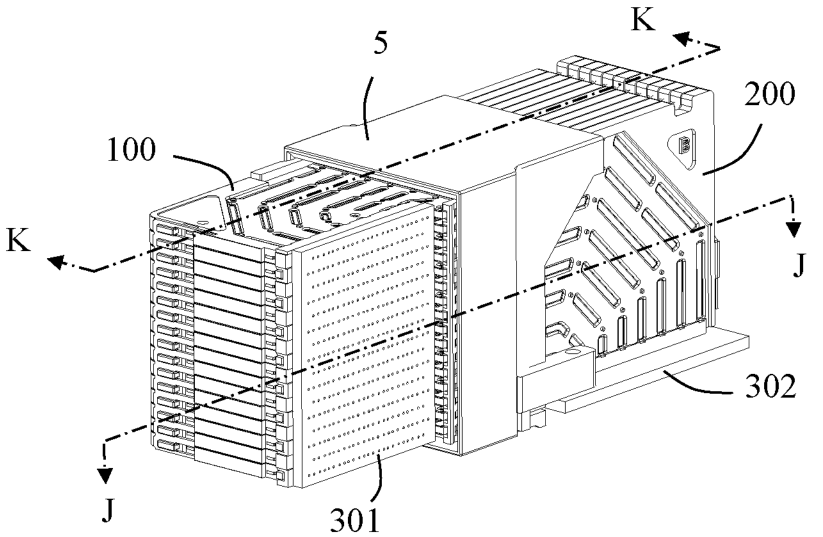


FIG. 1

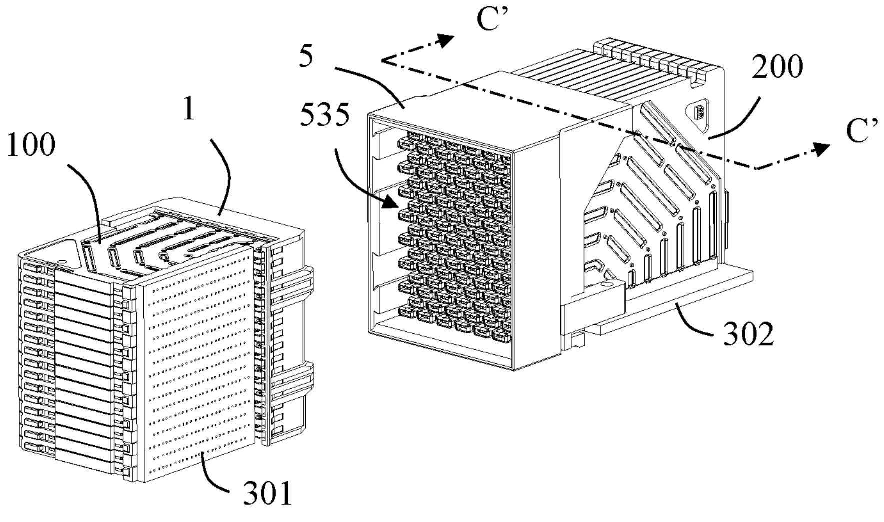


FIG. 2

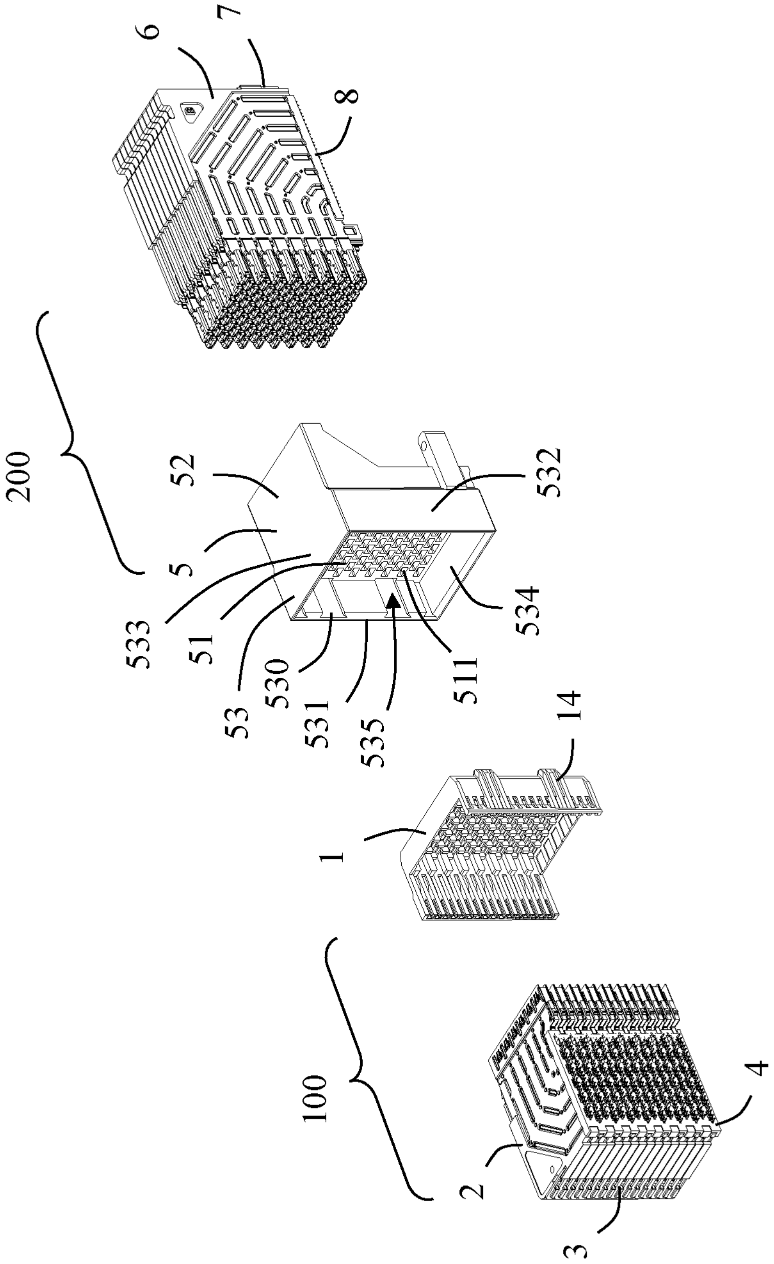


FIG. 3

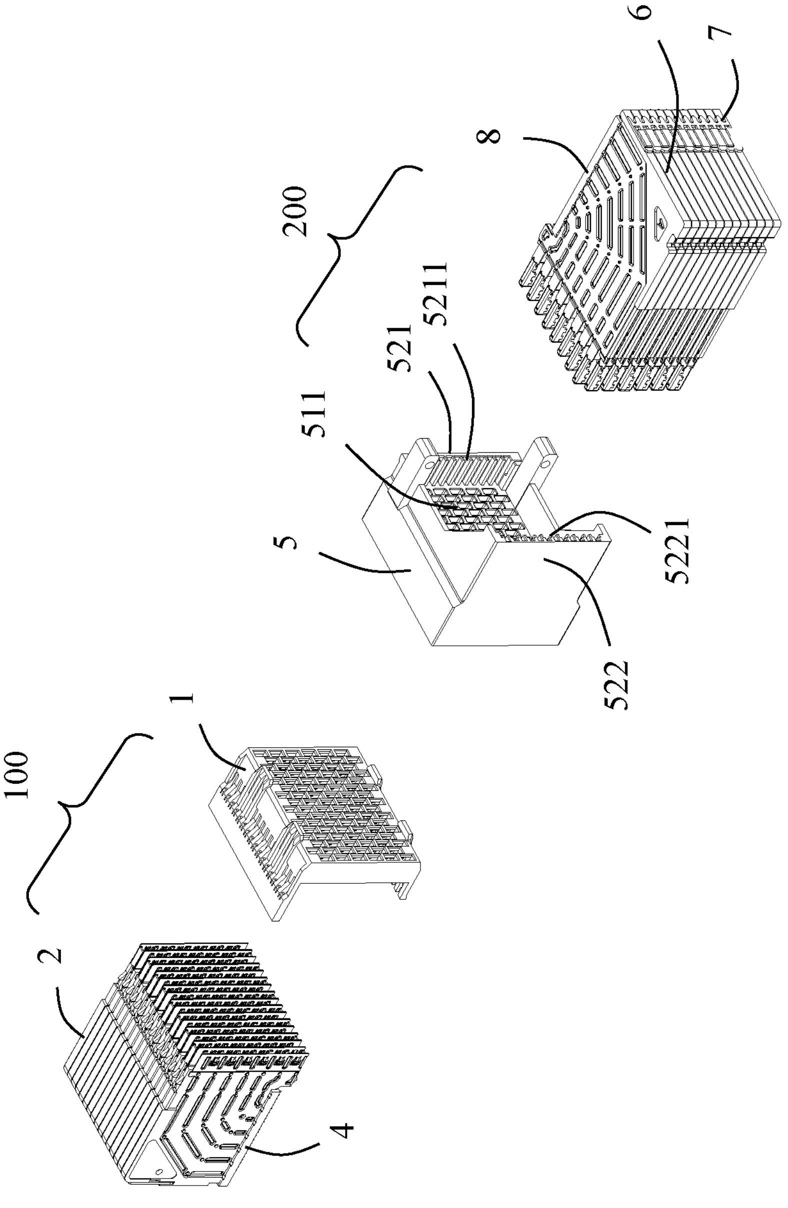


FIG. 4

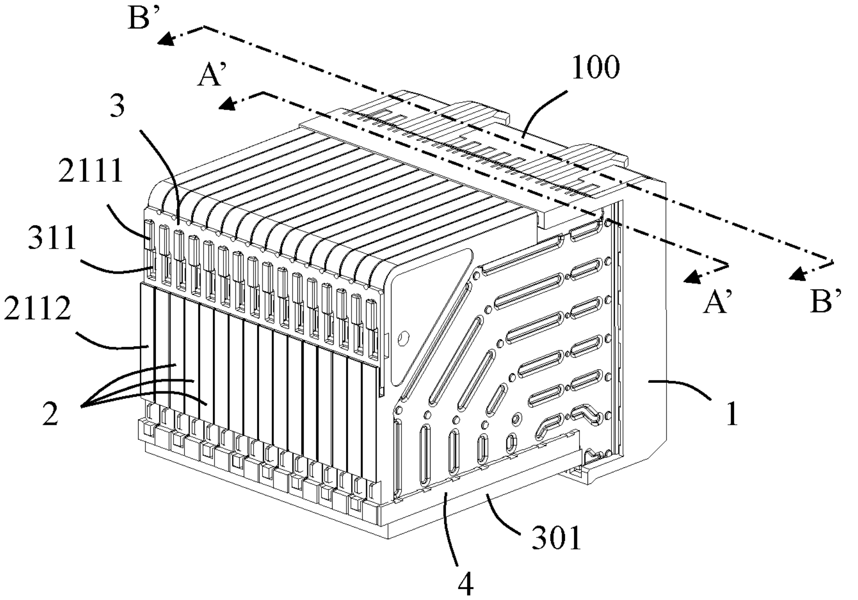


FIG. 5

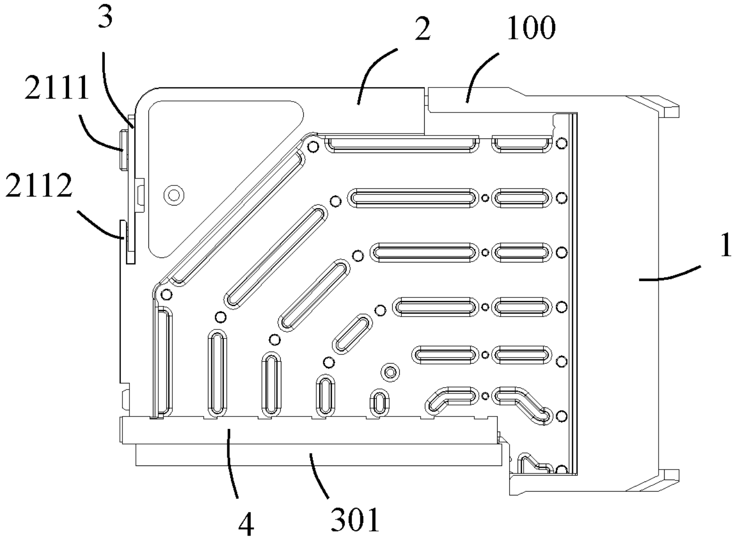


FIG. 6

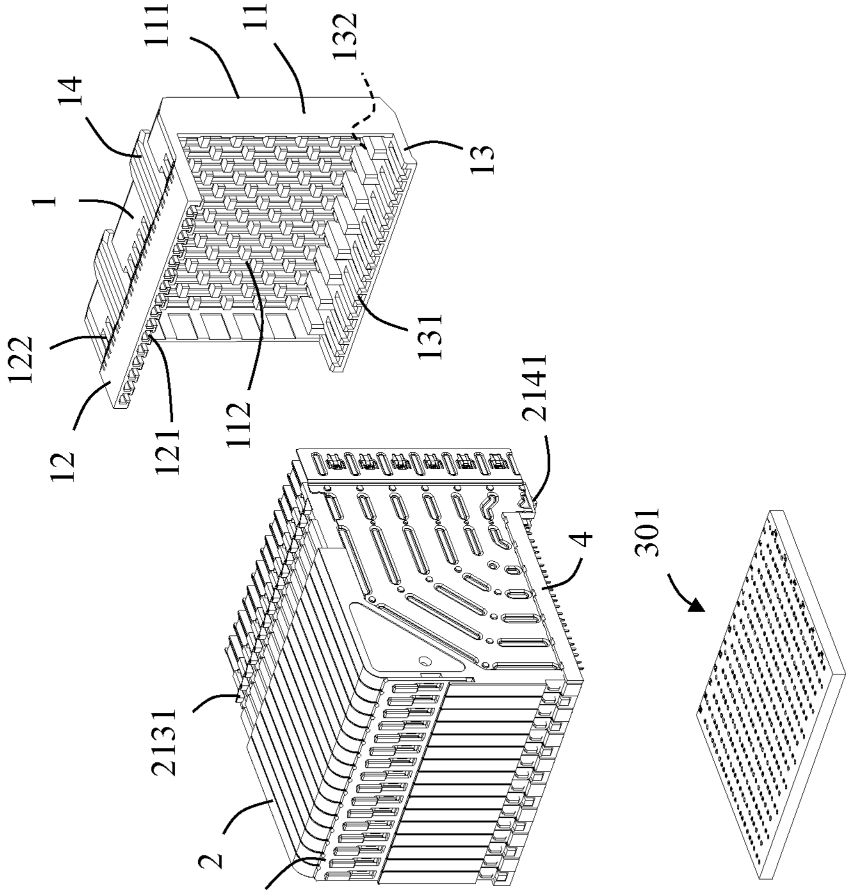


FIG. 7

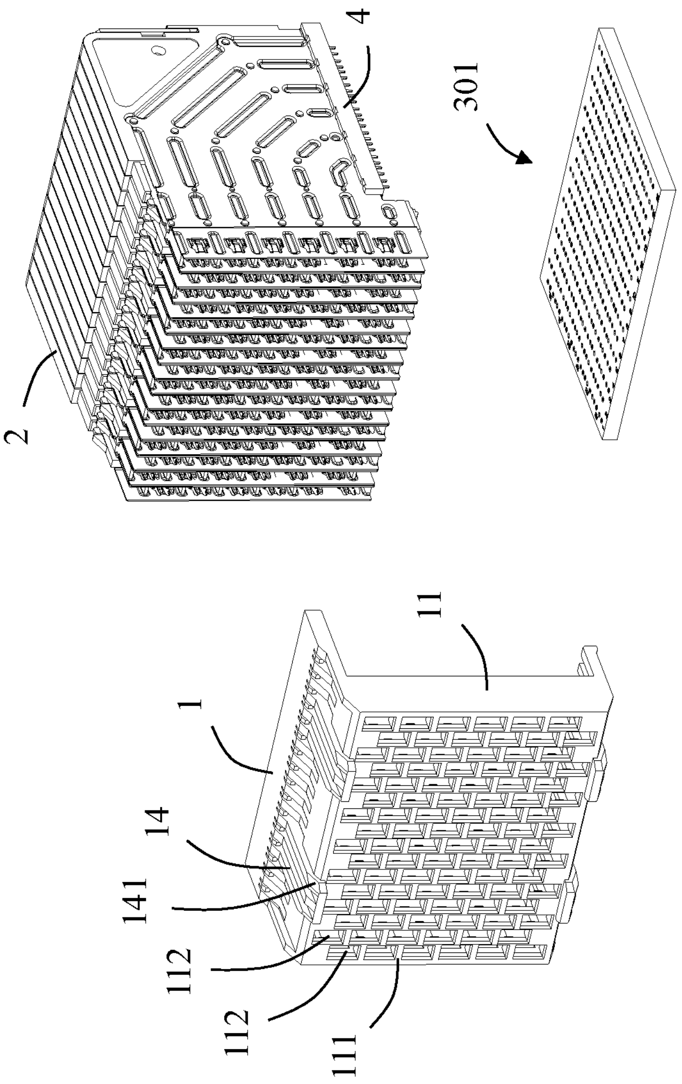


FIG. 8

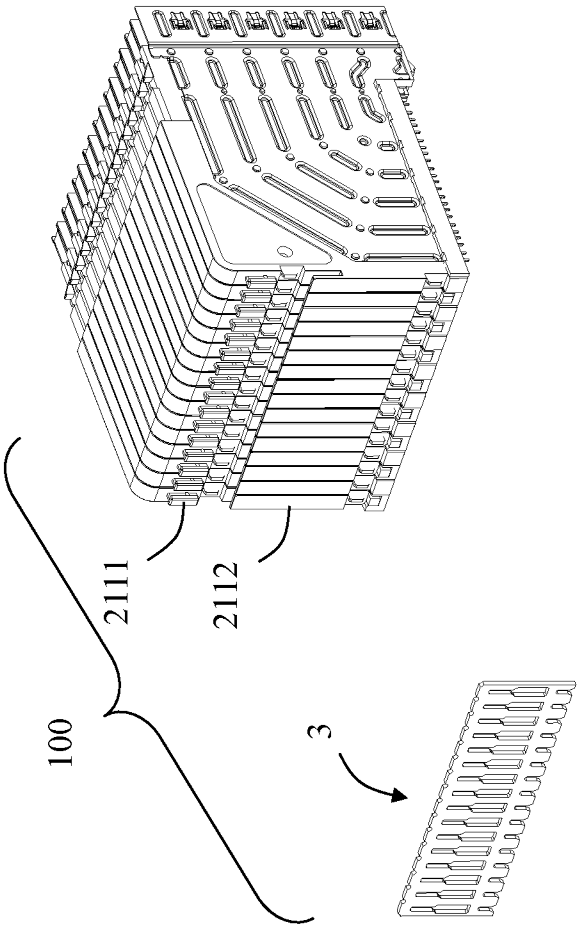


FIG. 9

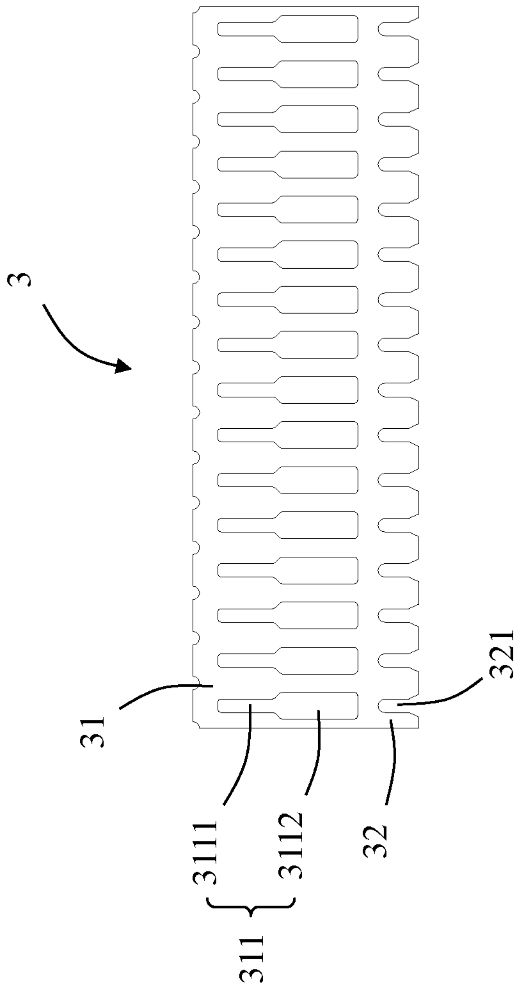


FIG. 10

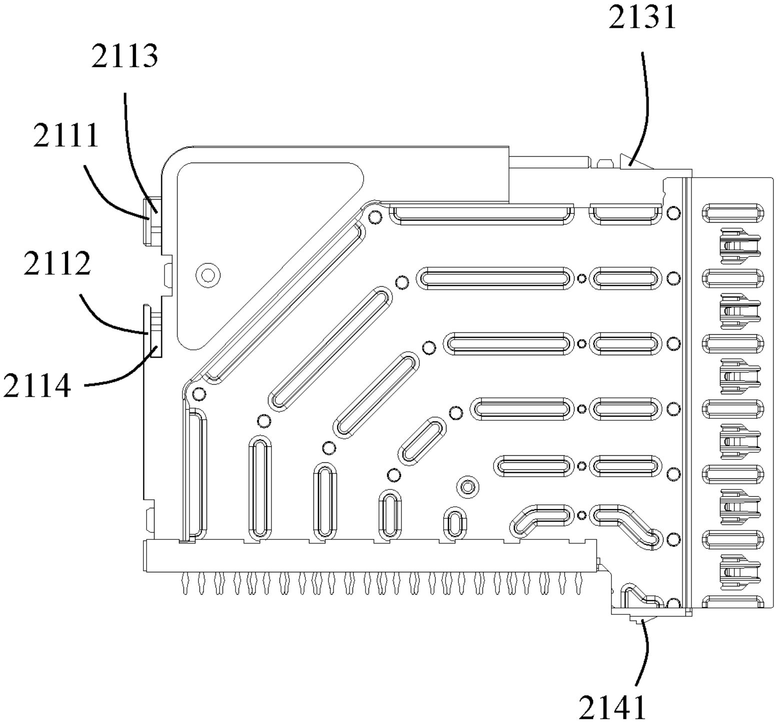


FIG. 11

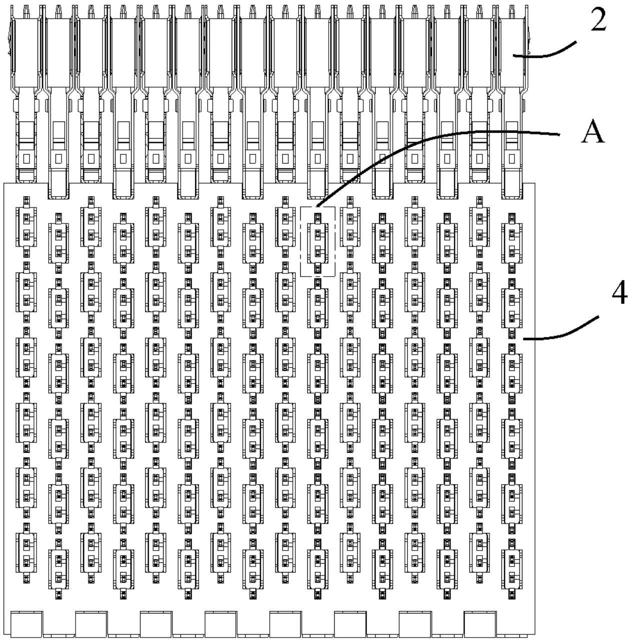


FIG. 12

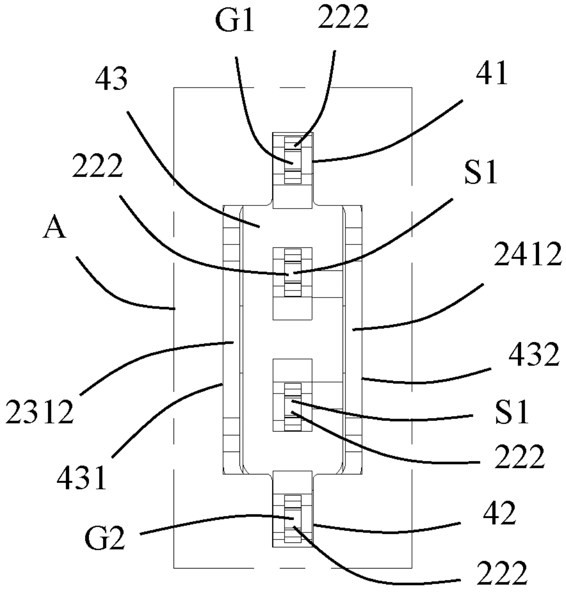


FIG. 13

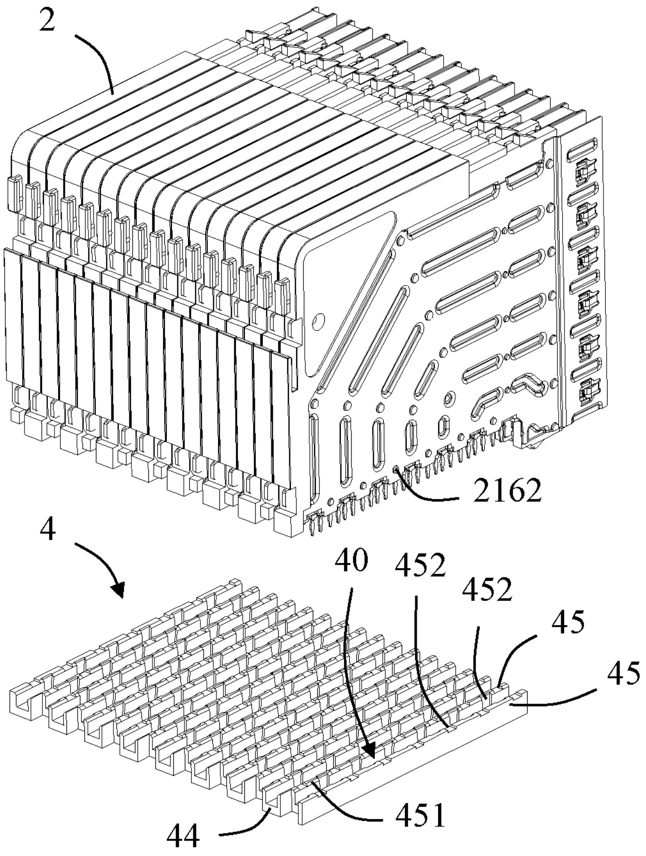


FIG. 14

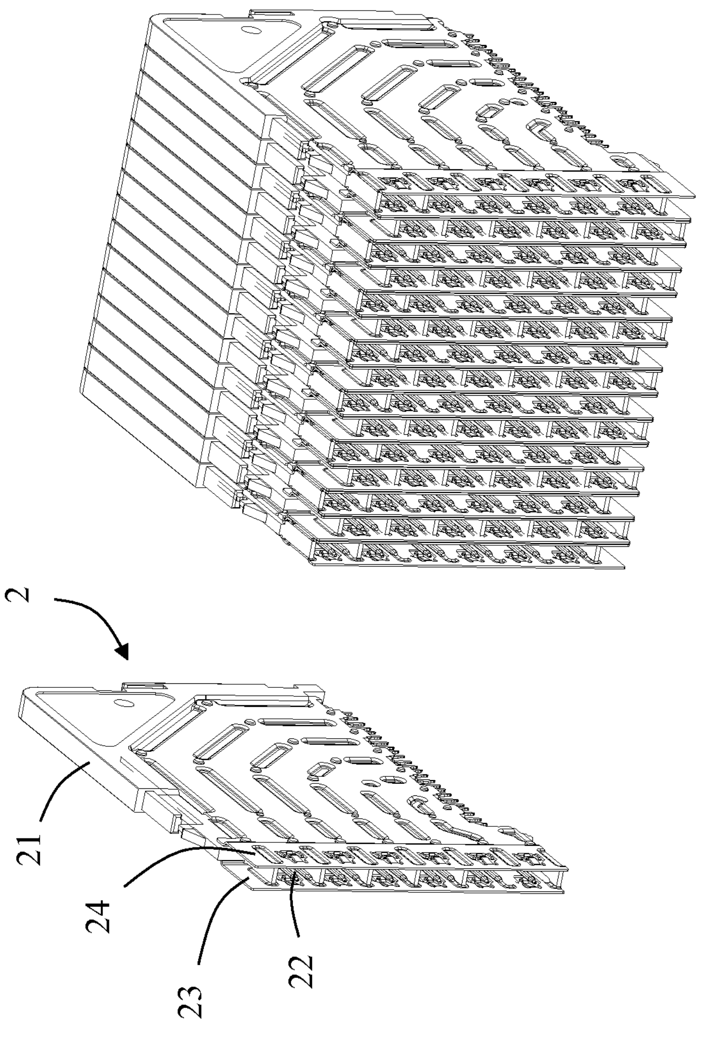


FIG. 15

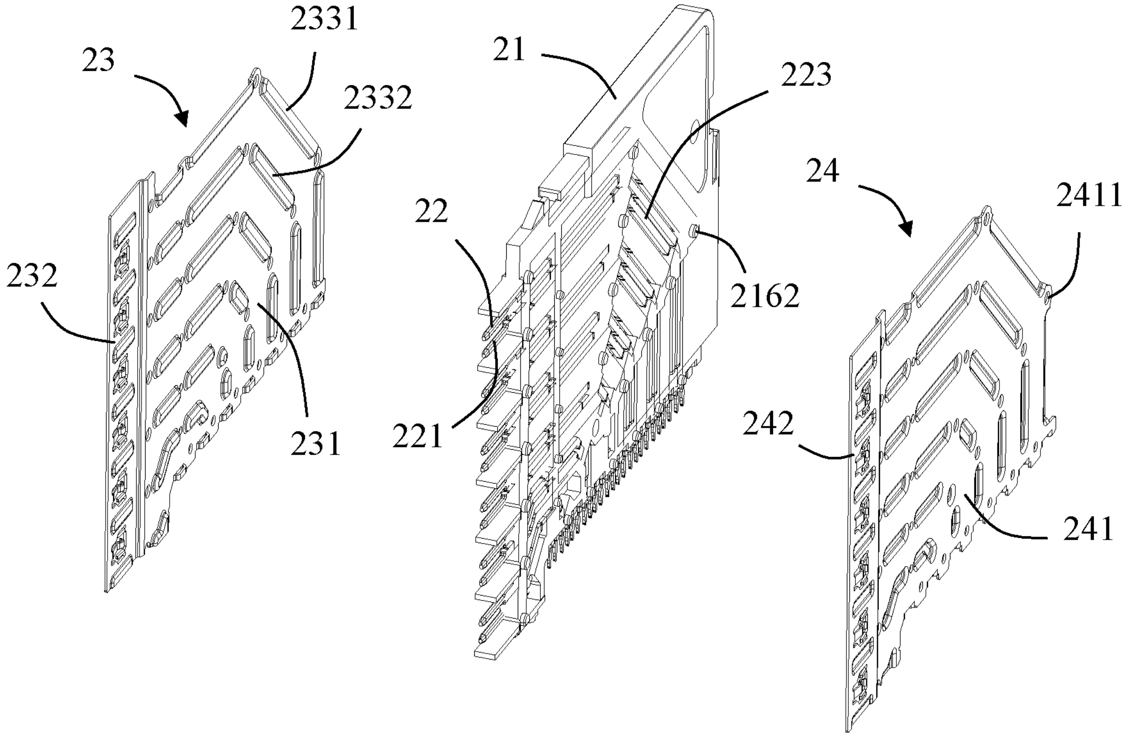


FIG. 16

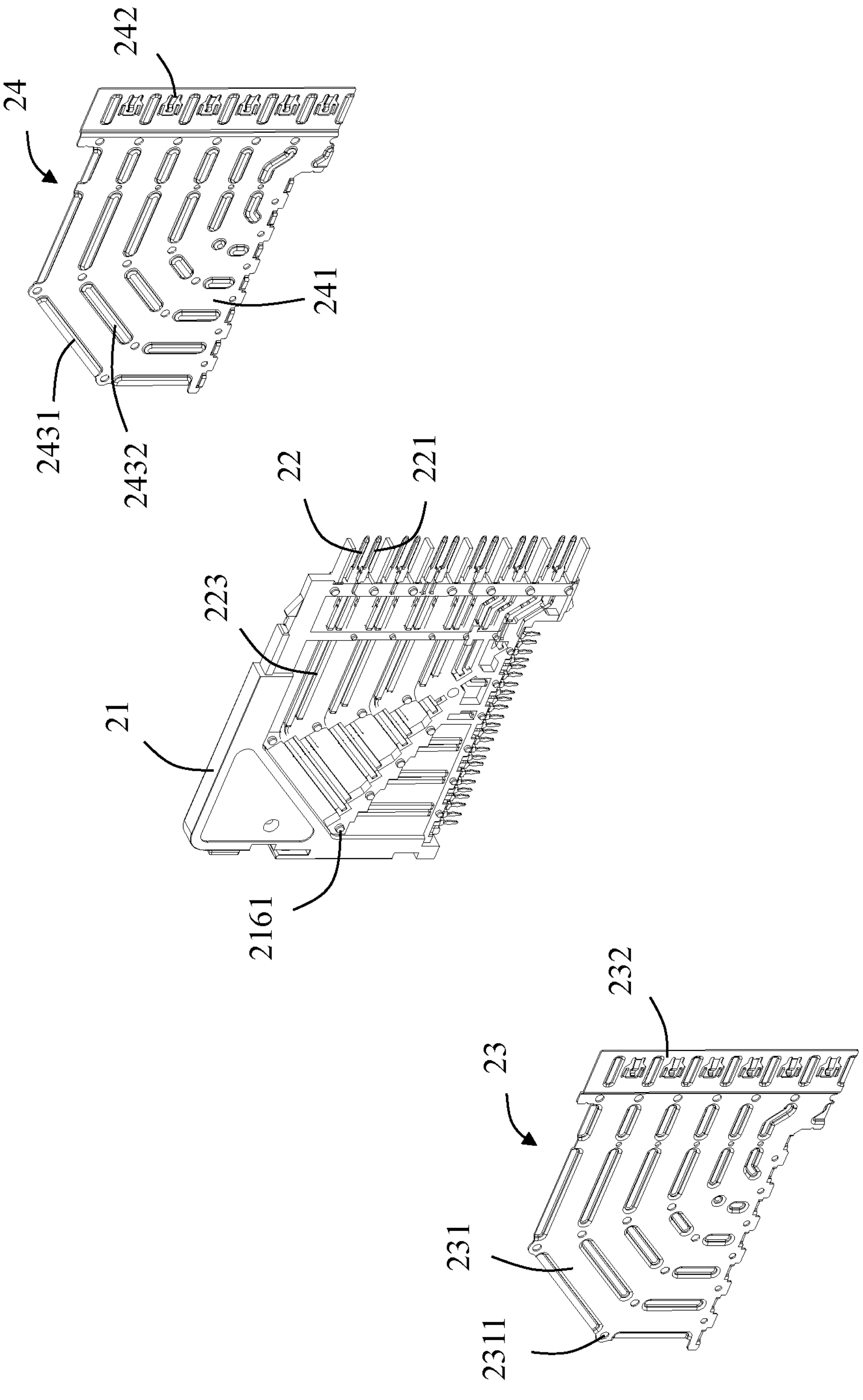


FIG. 17

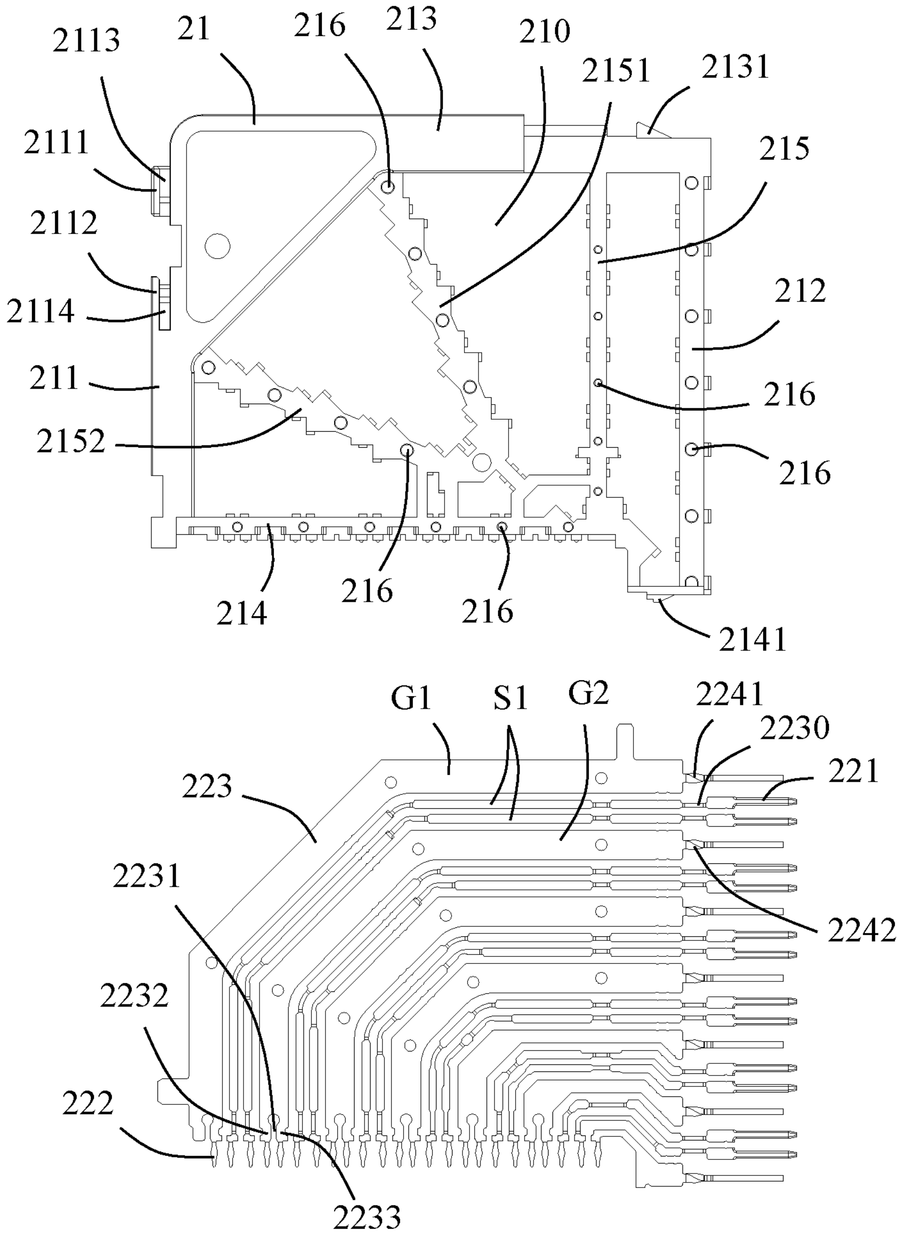

2113
21
216
213
210
2151
2131
2111
215
2112
2114
212
211
216
2152
216
214
216
216
2141
G1
S1
G2
2241
2230
221
223
2231
2242
2232
222
2233

FIG. 18

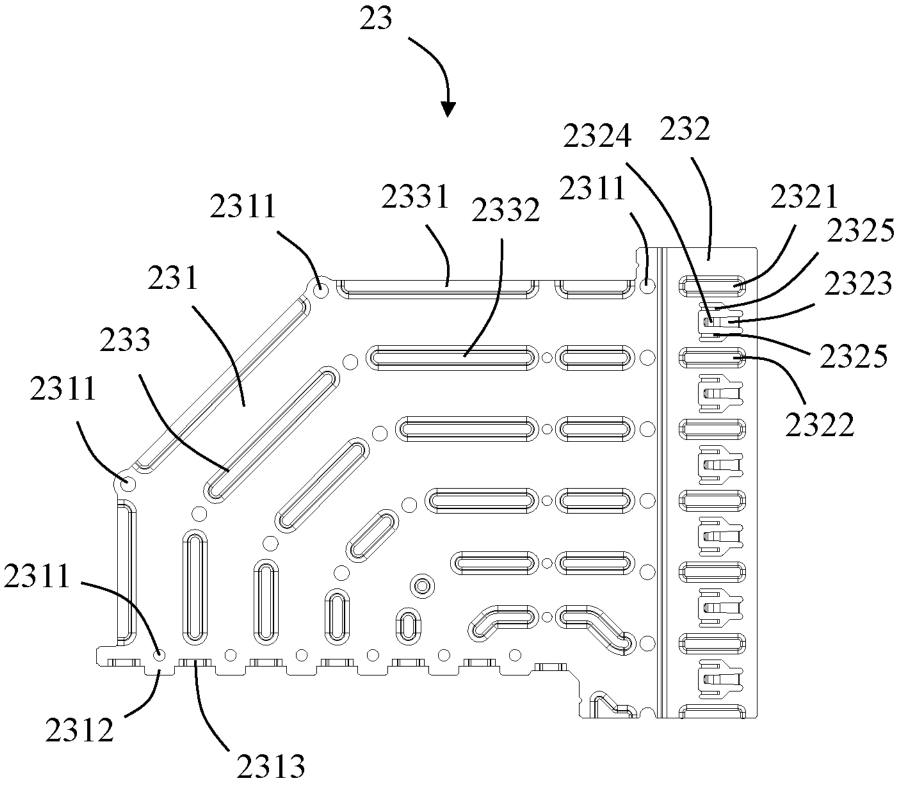

23
2324
232
2311
2331
2332
2311
2321
2325
231
2323
233
2325
2311
2322
2311
2312
2313

FIG. 19

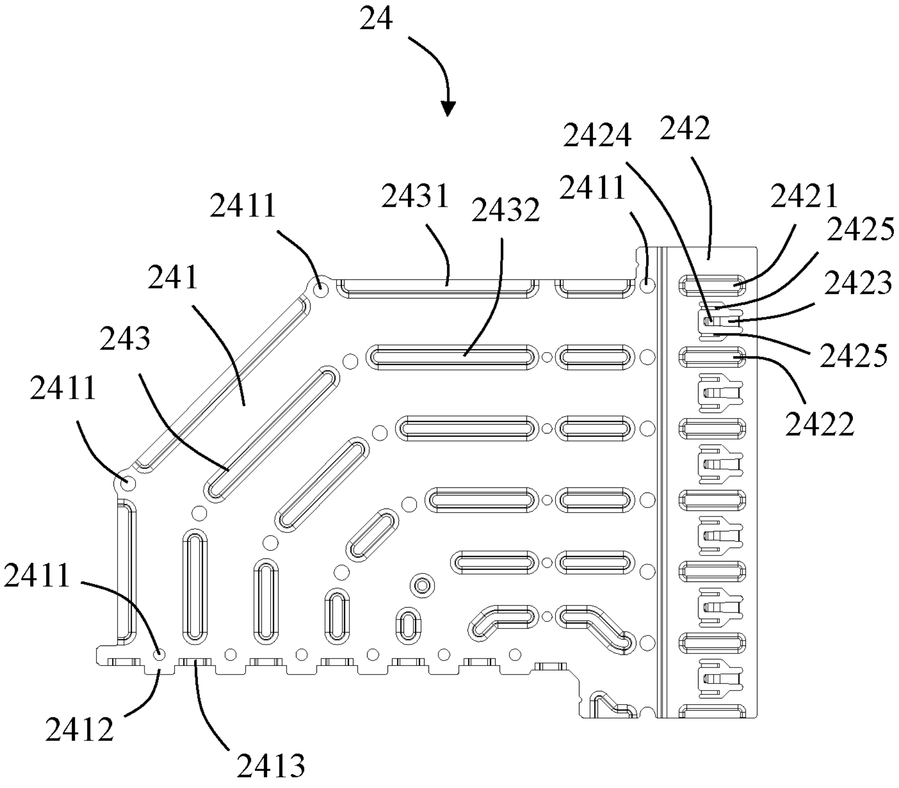

24
2424
242
2411
2431
2432
2411
2421
2425
241
2423
243
2425
2411
2422
2411
2412
2413

FIG. 20

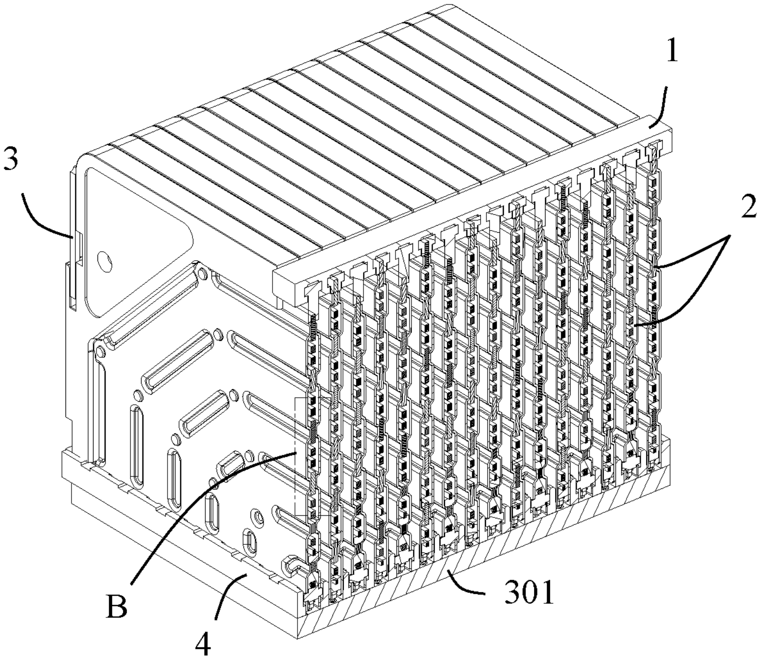


FIG. 21

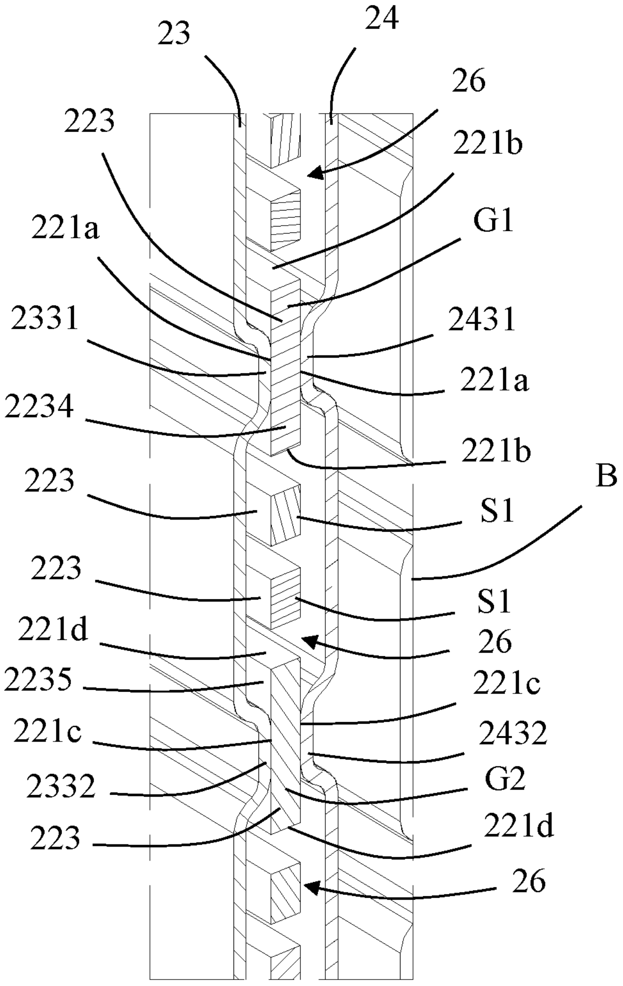

23
24
26
223
221b
G1
221a
2331
2431
221a
2234
221b
223
S1
B
223
S1
26
221d
2235
221c
221c
2432
2332
G2
223
221d
26

FIG. 22

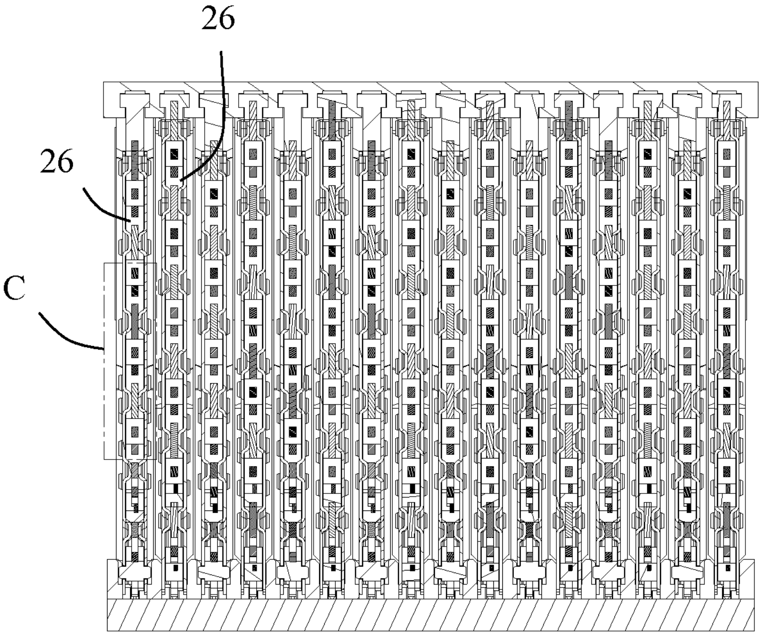


FIG. 23

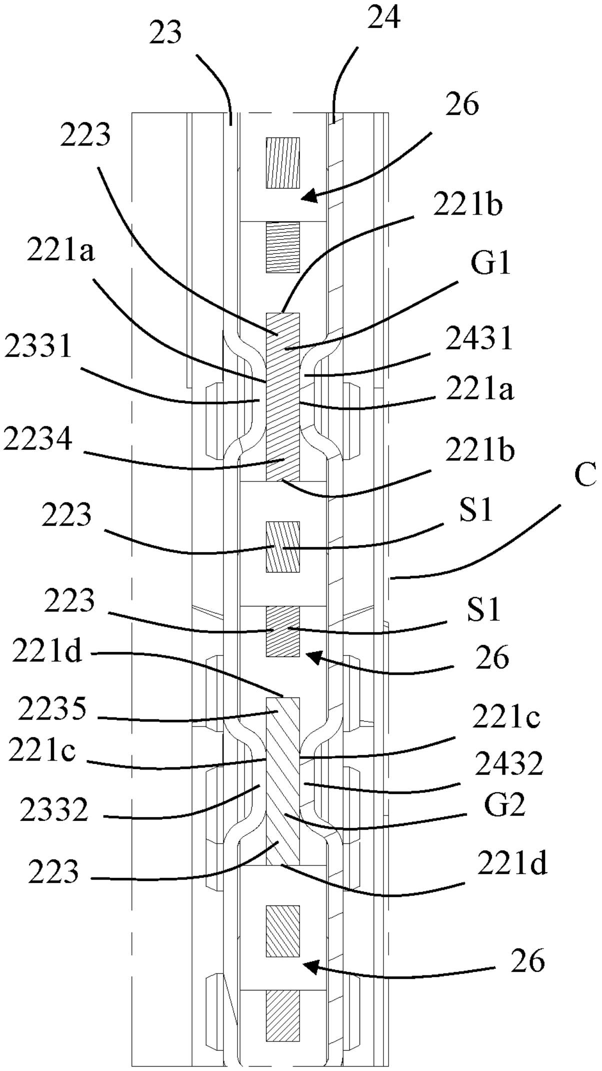

23
24
26
223
221b
221a
G1
2331
2431
221a
2234
221b
C
223
S1
223
S1
26
221d
2235
221c
221c
2432
2332
G2
223
221d
26

FIG. 24

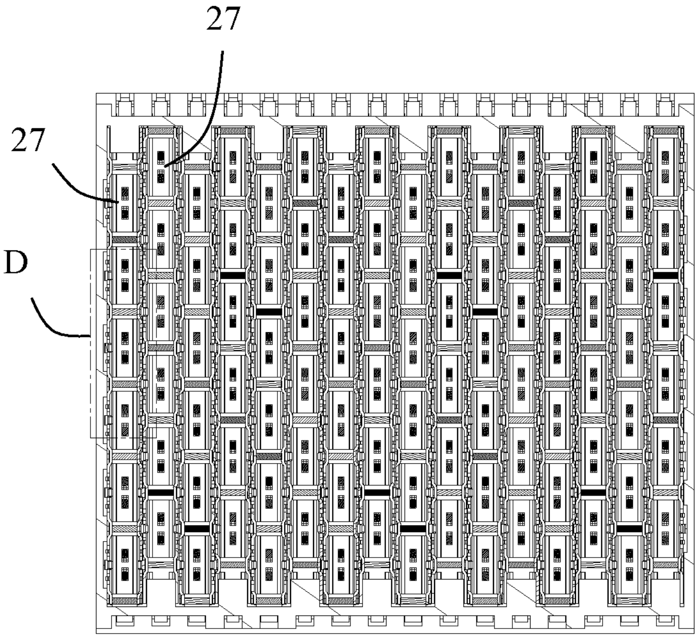


FIG. 25

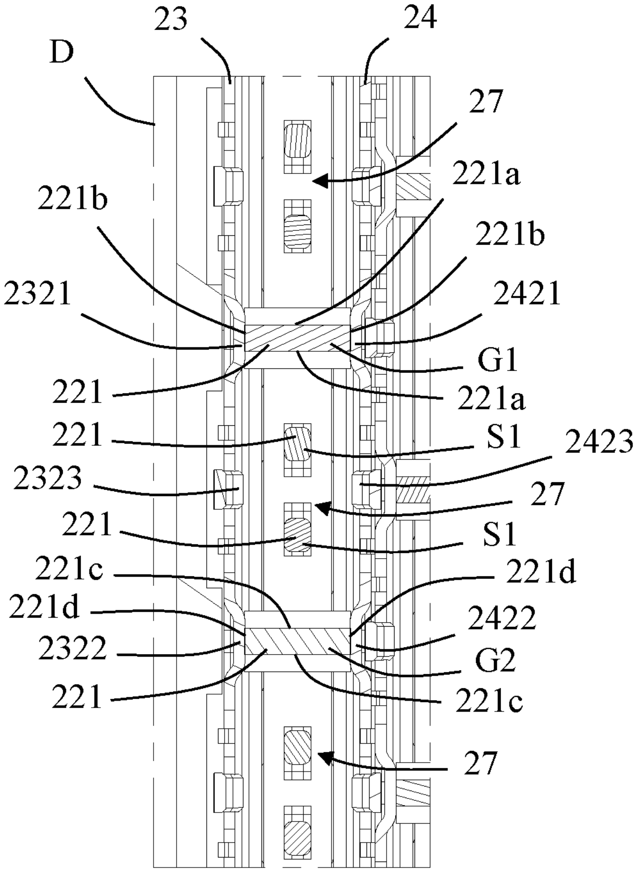

23
24
D
27
221a
221b
221b
2321
2421
G1
221
221a
221
S1
2423
2323
27
221
S1
221c
221d
221d
2422
2322
G2
221
221c
27

FIG. 26

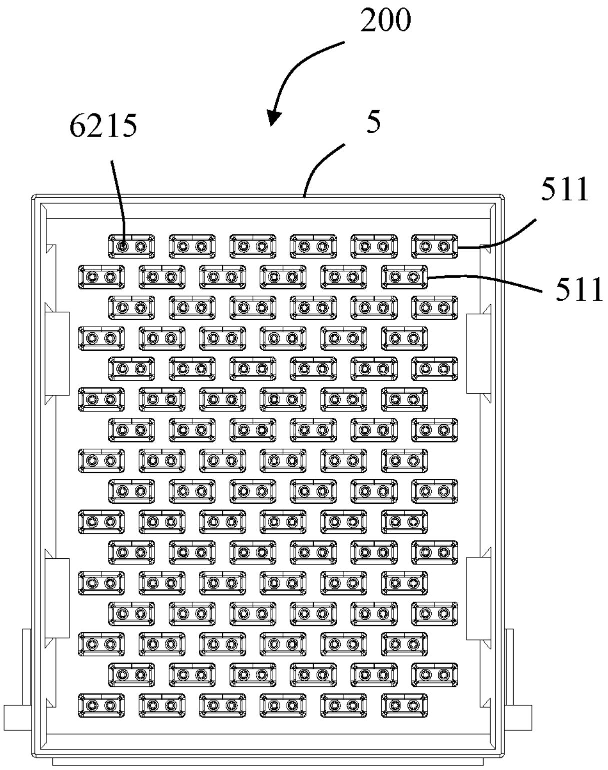


FIG. 27

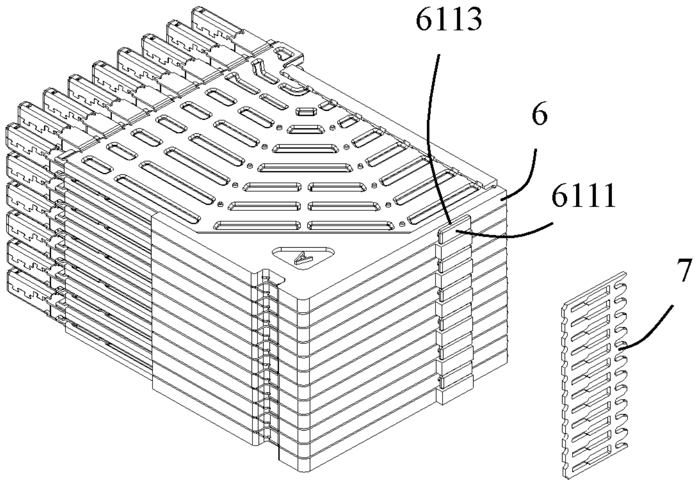


FIG. 28

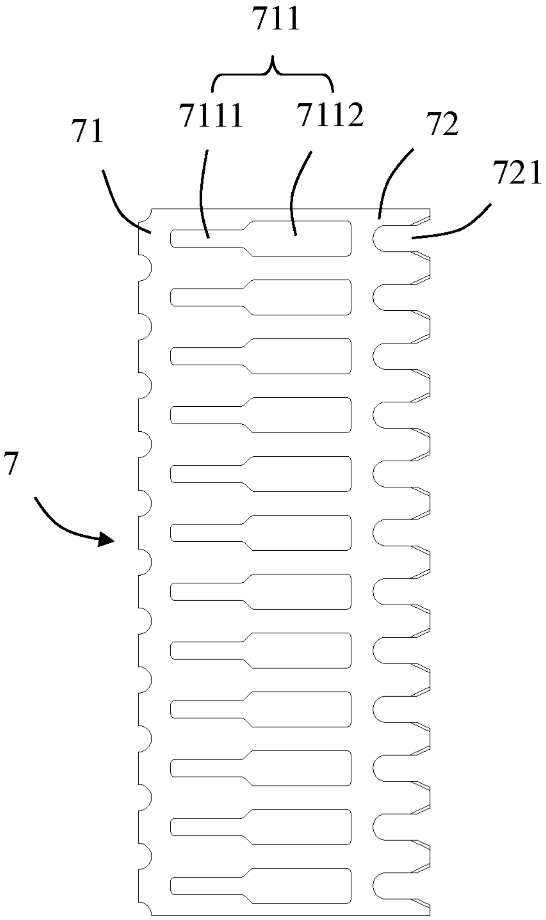


FIG. 29

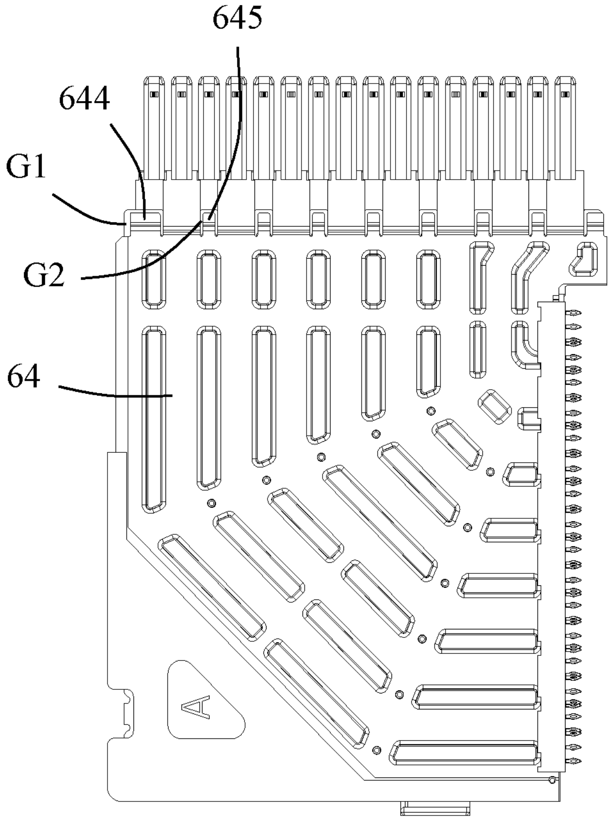


FIG. 30

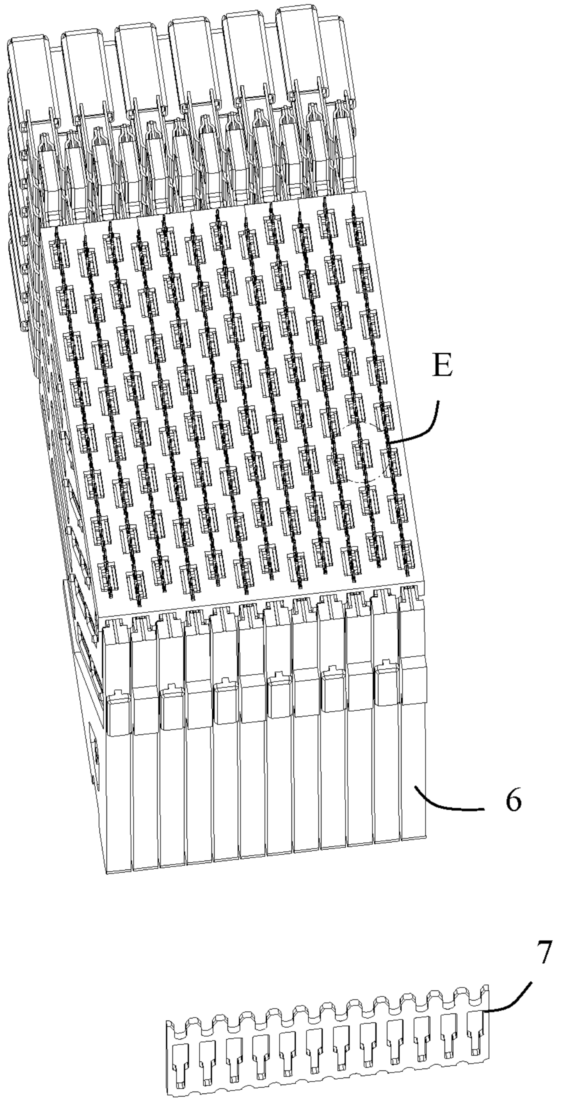


FIG. 31

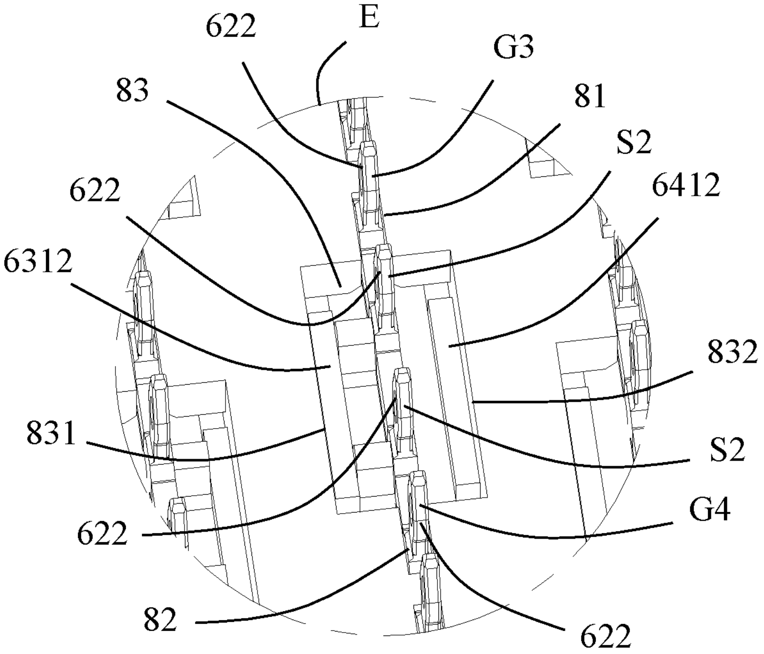


FIG. 32

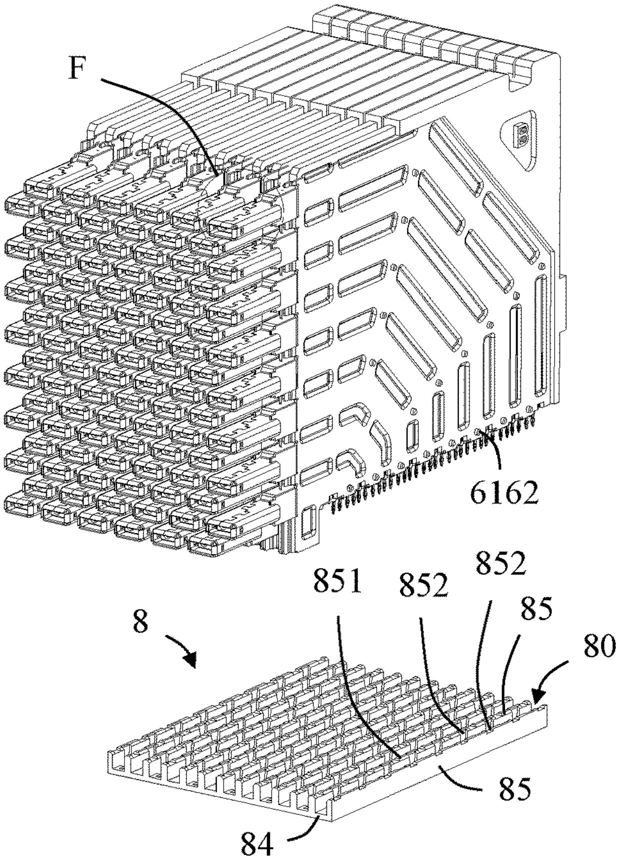

F
6162
851
852
852
85
8
80
85
84

FIG. 33

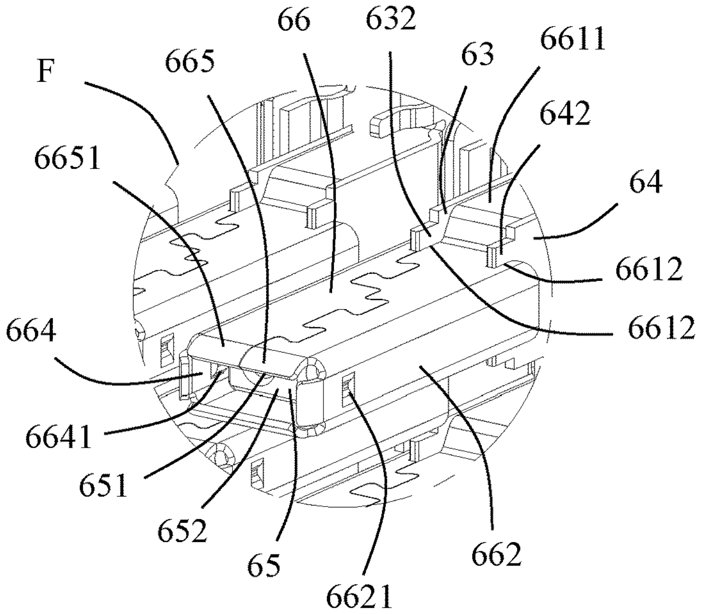

F
665
66
632
63
6611
642
6651
64
6612
6612
664
6641
651
652
65
6621
662

FIG. 34

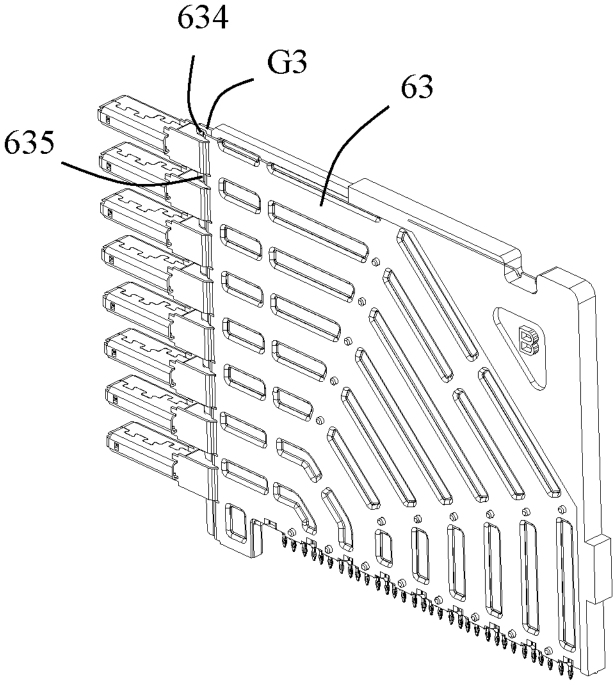


FIG. 35

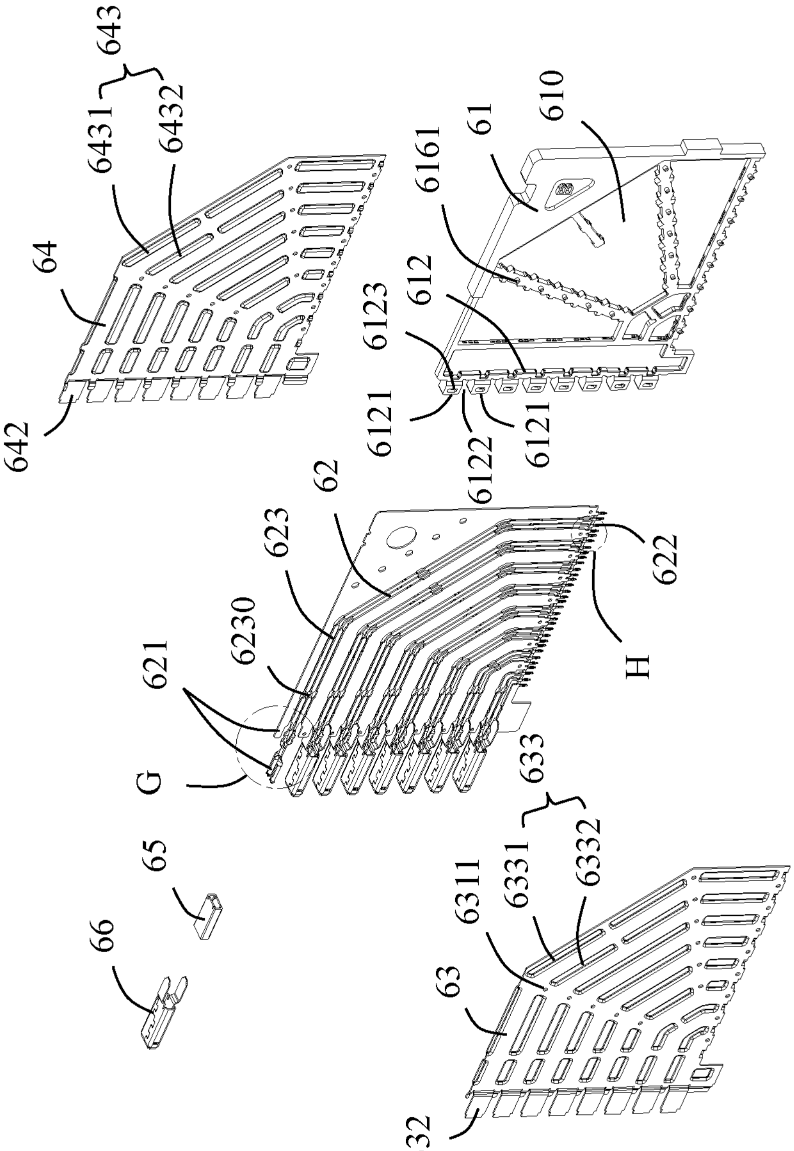

643
6431
6432
64
642
610
61
6161
612
6123
6121
6122
6121
62
623
6230
621
622
H
G
65
66
633
6311
6331
6332
63
632

FIG. 36

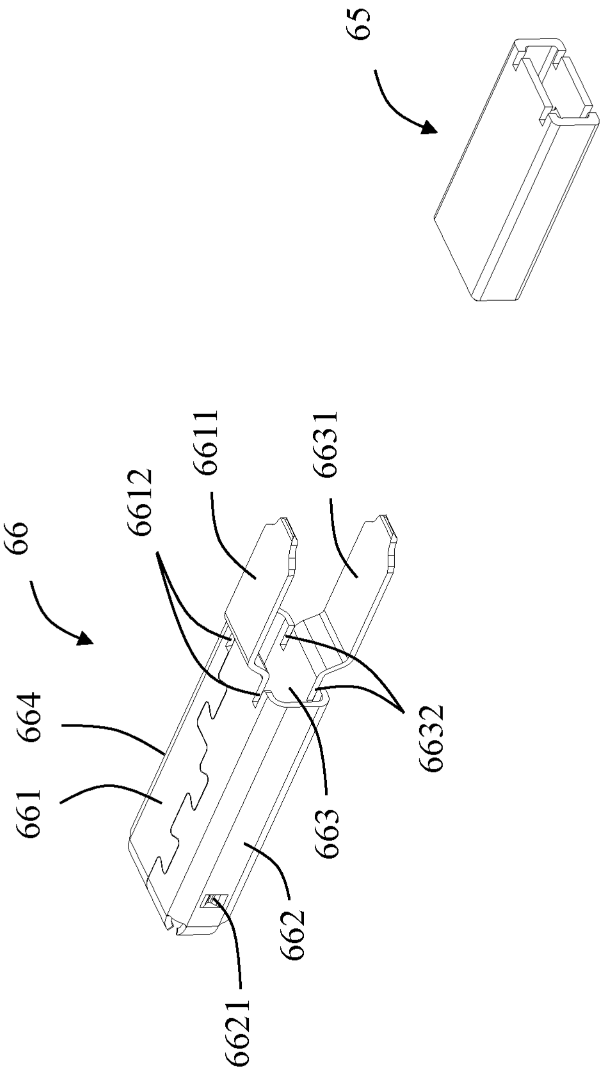


FIG. 37

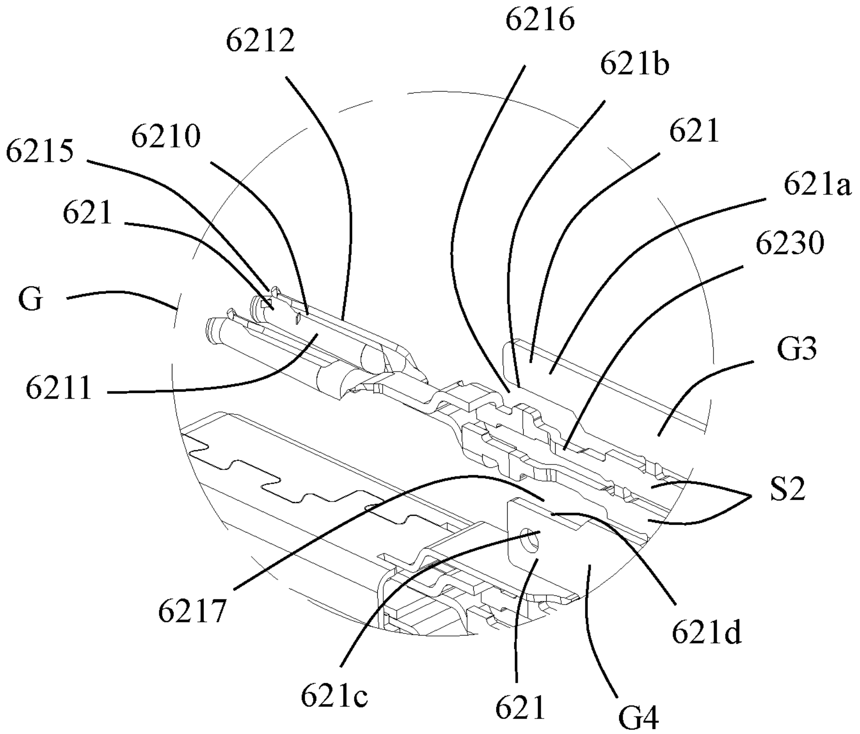

6212
6216
621b
6215
6210
621
621a
621
6230
G
G3
6211
S2
6217
621d
621c
621
G4

FIG. 38

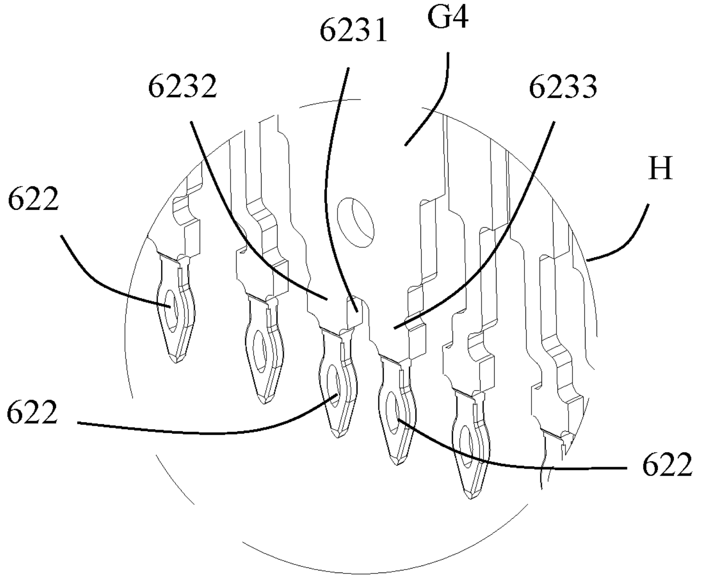

6231
G4
6232
6233
H
622
622
622

FIG. 39

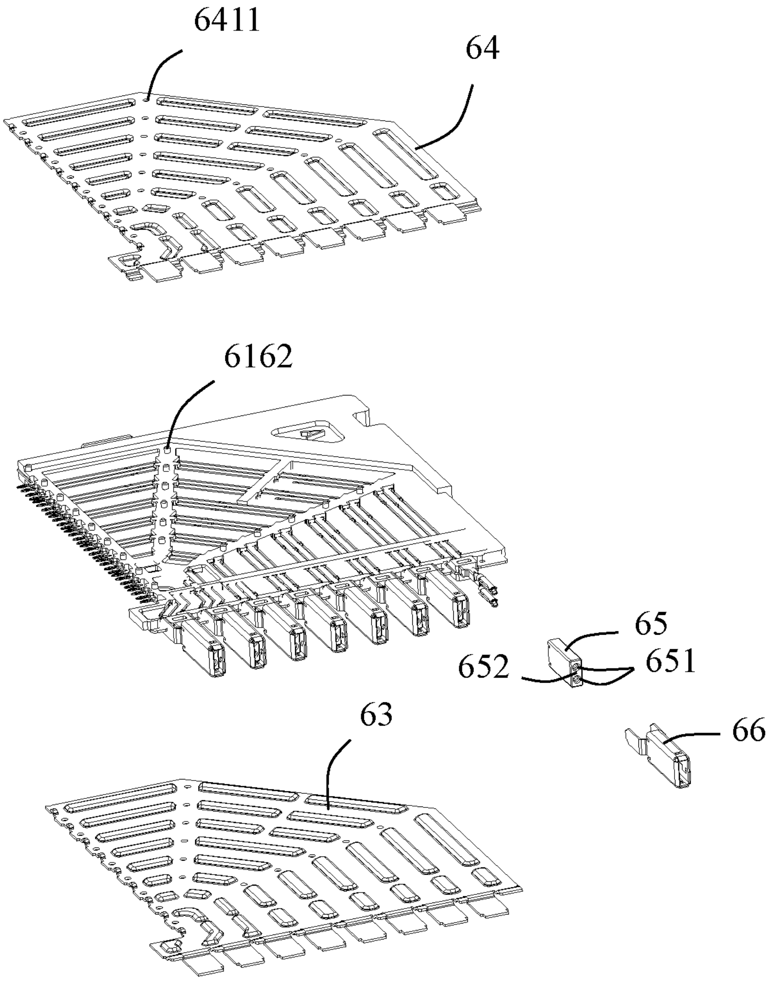


FIG. 40

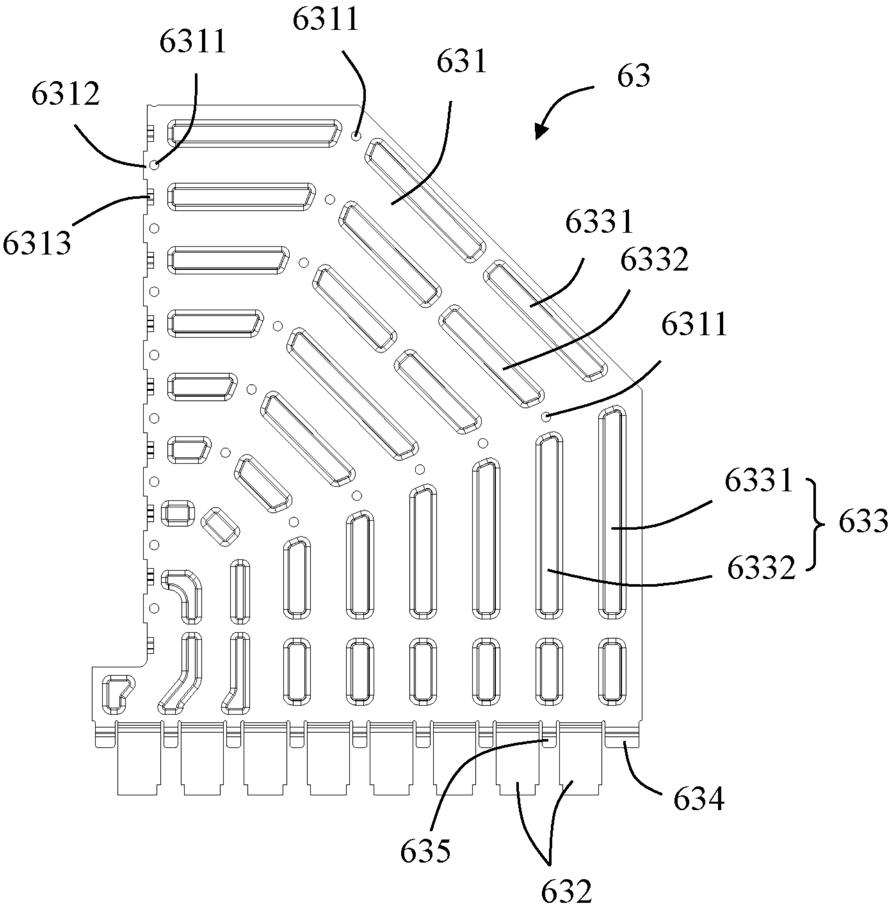

6311
6311
6312
631
63
6313
6331
6332
6311
6331
633
6332
634
635
632

FIG. 41

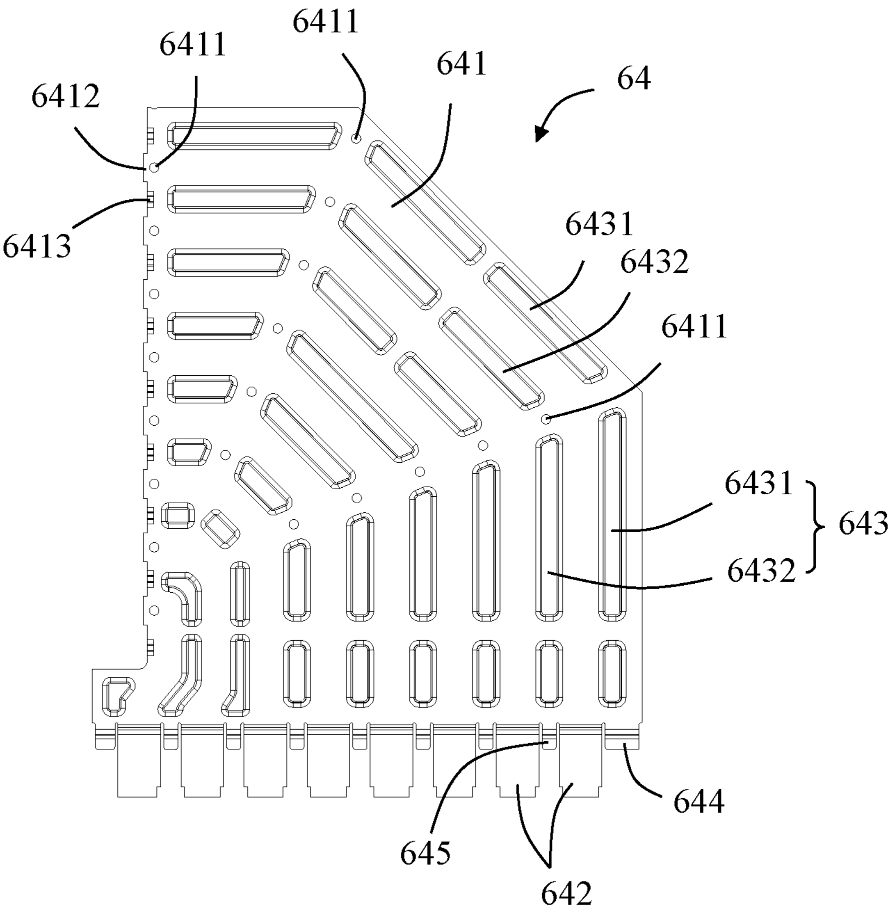
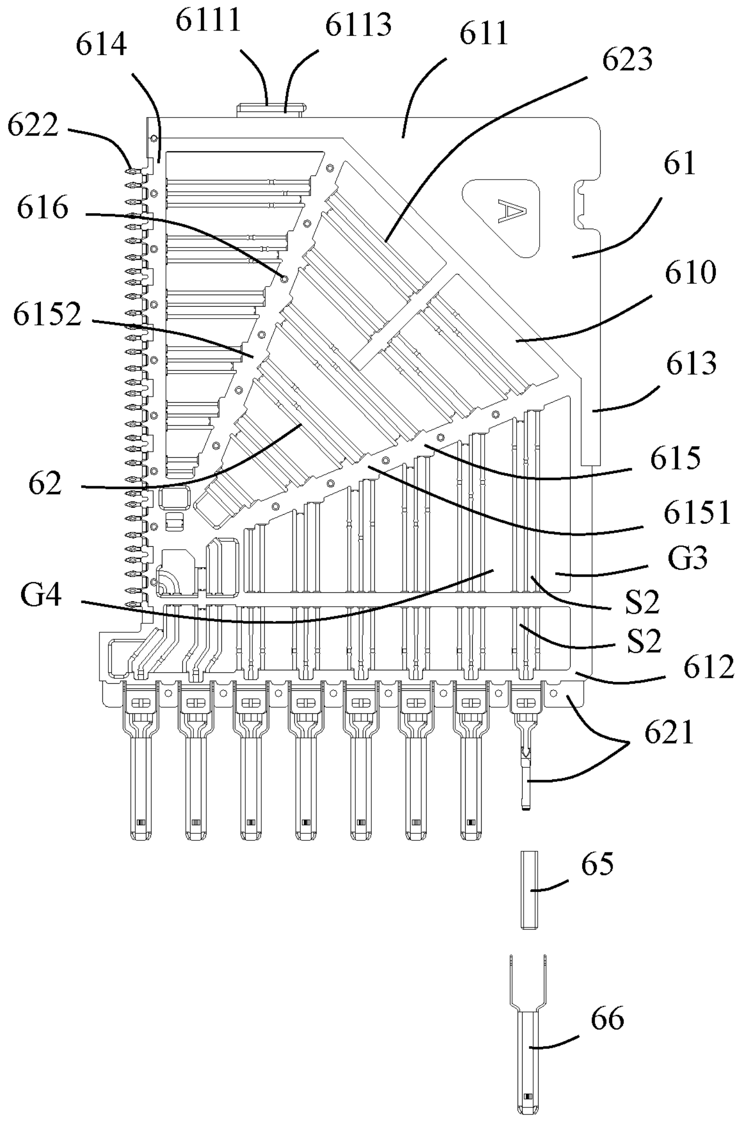

6411
6411
6412
641
64
6413
6431
6432
6411
6431
643
6432
644
645
642

FIG. 42



6111
6113
611
614
623
622
61
616
610
6152
613
615
62
6151
G3
G4
S2
S2
612
621
65
66
A

FIG. 43

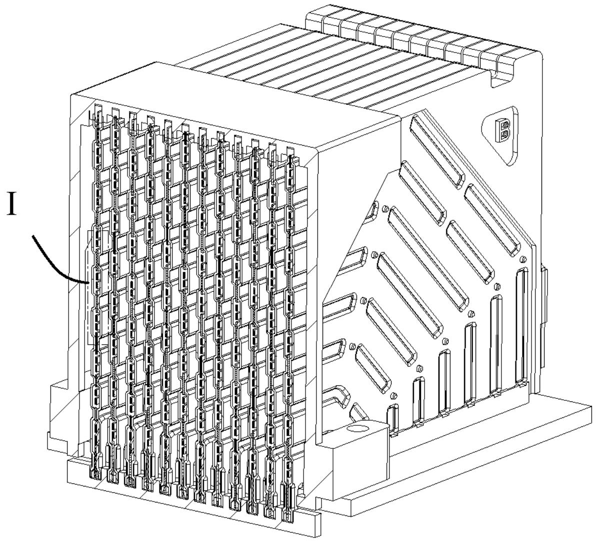


FIG. 44

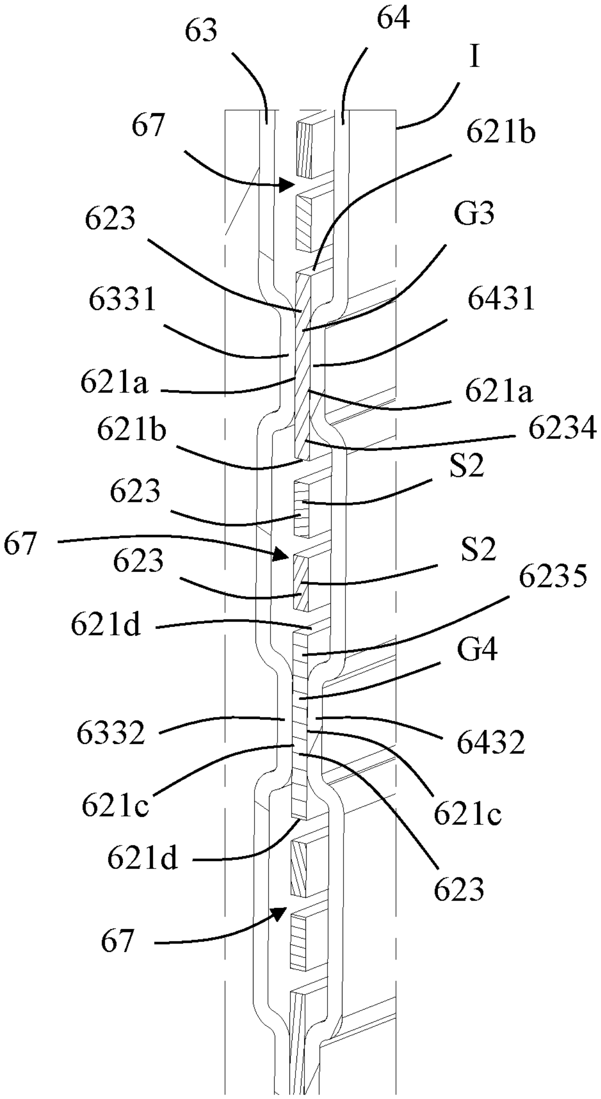

63
64
I
67
621b
623
G3
6331
6431
621a
621a
621b
6234
623
S2
67
623
S2
6235
621d
G4
6332
6432
621c
621c
621d
623
67

FIG. 45

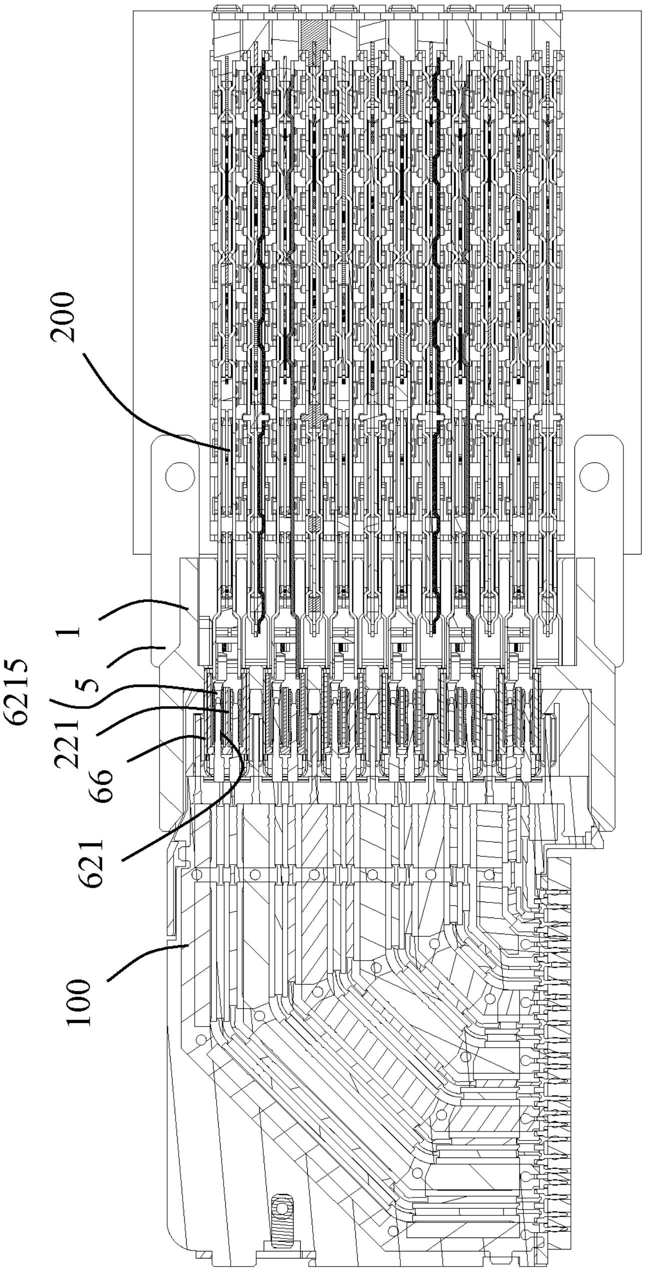


FIG. 46

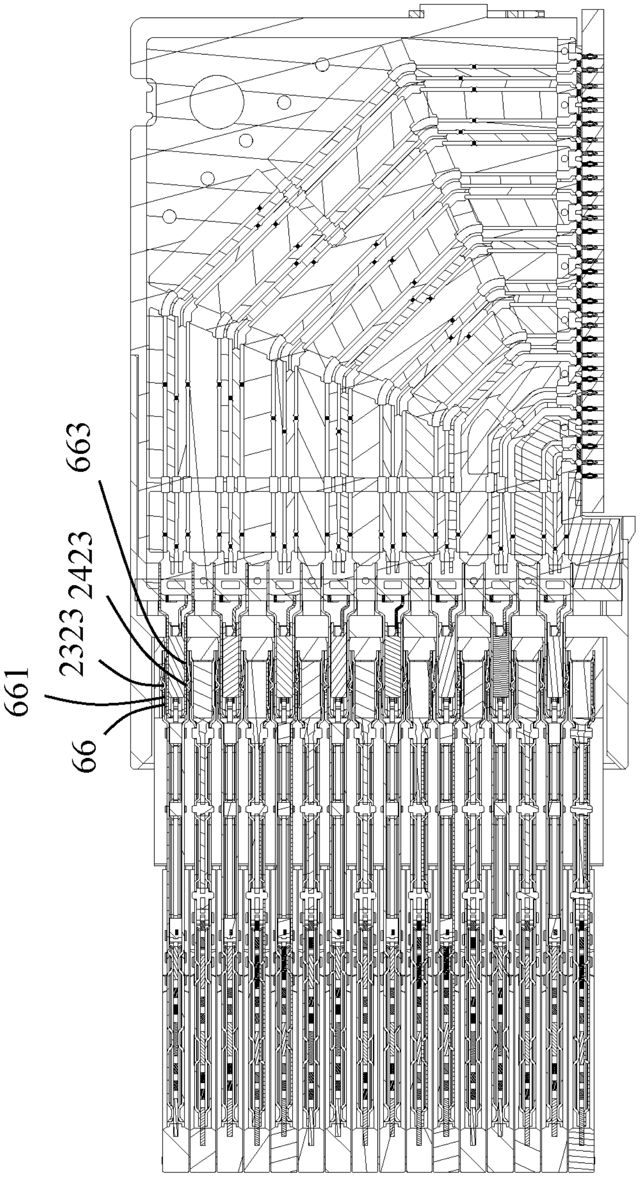


FIG. 47

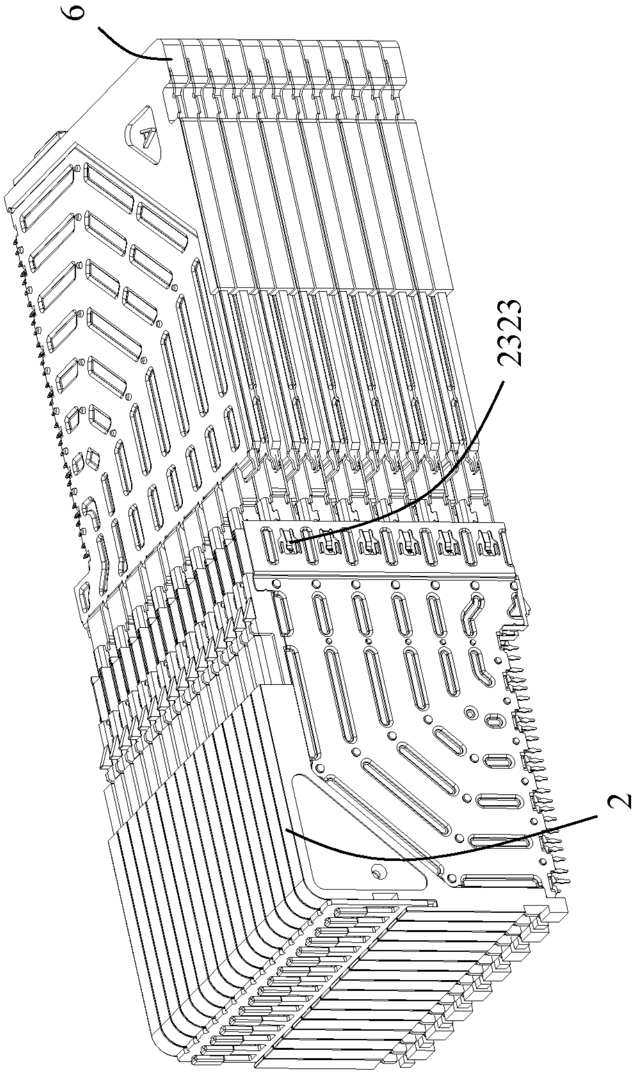


FIG. 48

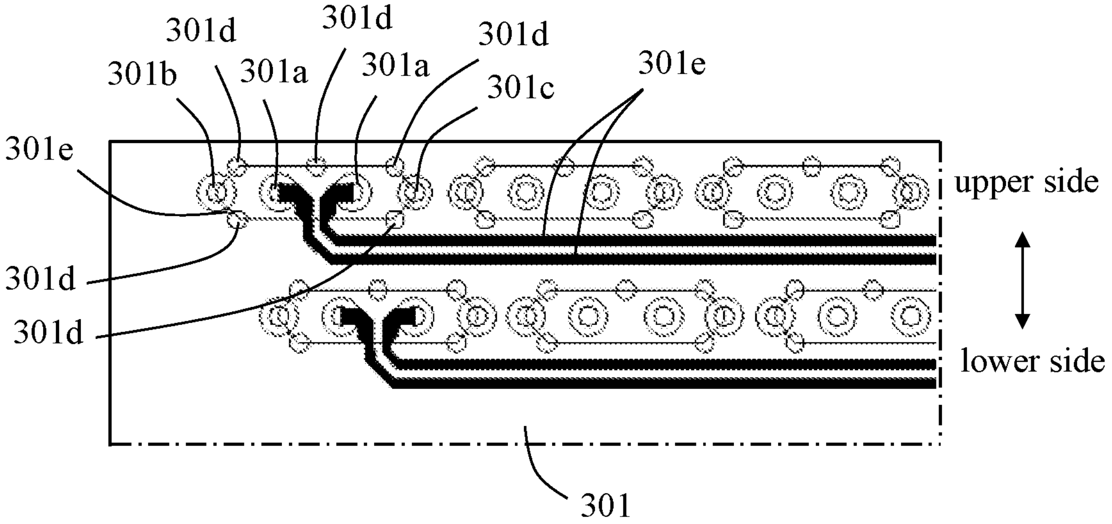

301d
301d
301d
301b
301a
301a
301c
301e
301e
upper side
301d
301d
lower side
301

FIG. 49

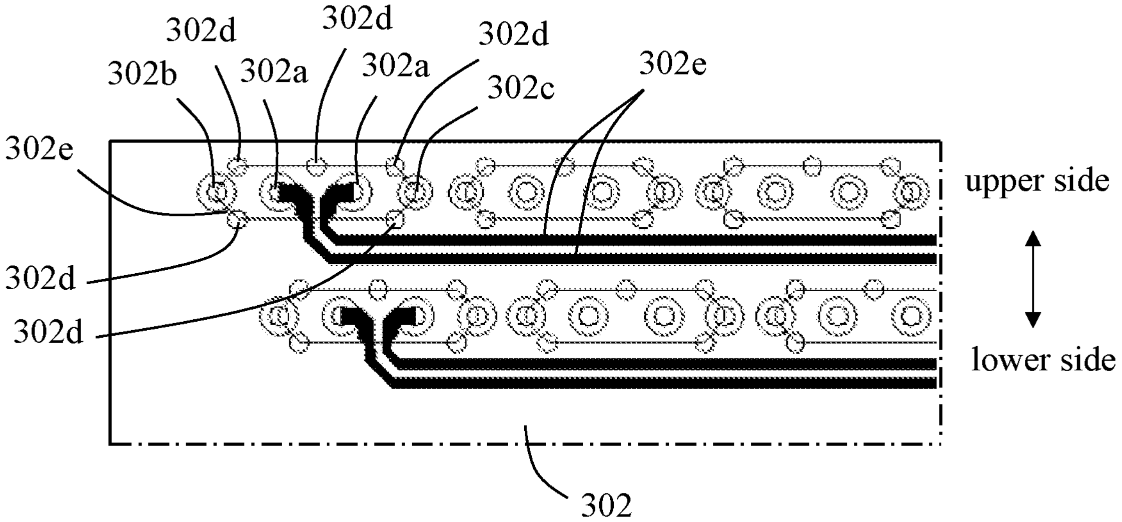

302d
302d
302d
302b
302a
302a
302c
302e
302e
upper side
302d
302d
lower side
302

FIG. 50

BACKPLANE CONNECTOR ASSEMBLY WITH IMPROVED SHIELDING EFFECT

CROSS-REFERENCE TO RELATED APPLICATIONS

This patent application claims priority of a Chinese Patent Application No. 202010567796.4, filed on Jun. 19, 2020 and titled "BACKPLANE CONNECTOR ASSEMBLY", and a Chinese Patent Application No. 202010709127.6, filed on Jul. 22, 2020 and titled "BACKPLANE CONNECTOR ASSEMBLY", the entire content of which is incorporated herein by reference.

TECHNICAL FIELD

The present disclosure relates to a backplane connector assembly which belongs to a technical field of connectors.

BACKGROUND

Existing backplane connector assemblies usually include a male connector and a female connector. The male connector usually includes a male housing and a plurality of male wafers mounted to the male housing. Each male wafer includes a first insulating frame, a plurality of male conductive terminals insert-molded with the first insulating frame, and a first metal shield located on at least one side of the first insulating frame. The female connector usually includes a female housing and a plurality of female wafers mounted to the female housing. Each female wafer includes a second insulating frame, a plurality of female conductive terminals insert-molded with the second insulating frame, and a second metal shield located on at least one side of the second insulating frame.

When the male connector and the female connector are mated, the male conductive terminals and the female conductive terminals are in contact with each other, and the first metal shield and the second metal shield are mated with each other.

However, with the continuous improvement of the signal transmission requirements of high-speed connectors, there is still room for improvement in the shielding of the differential signal terminals of the existing backplane connector assemblies.

SUMMARY

An object of the present disclosure is to provide a backplane connector assembly with improved shielding effect.

In order to achieve the above object, the present disclosure adopts the following technical solution: a backplane connector assembly, comprising a first backplane connector and a second backplane connector mateable with the first backplane connector. The first backplane connector comprises a first wafer. The first wafer comprises a plurality of first conductive terminals each comprising a first connection portion and a first contact portion; a first insulating frame, the first insulating frame being fixed with the first connection portion; a first metal shield, the first metal shield comprising a first extension portion; and a second metal shield, the second metal shield comprising a second extension portion. Wherein the first conductive terminals comprise first differential signal terminals, a first ground terminal and a second ground terminal; and wherein the first differential signal terminals are located between the first ground terminal and the second ground terminal. The second backplane connector comprises a second wafer. The second wafer comprises a plurality of second conductive terminals each comprising a second connection portion and a second contact portion; a second insulating frame, the second insulating frame being fixed with the second connection portion; a third metal shield, the third metal shield comprising a third extension portion; and a fourth metal shield, the fourth metal shield comprising a fourth extension portion. Wherein the second conductive terminals comprise second differential signal terminals, a third ground terminal and a fourth ground terminal; and wherein the second differential signal terminals are located between the third ground terminal and the fourth ground terminal. Wherein the first extension portion comprises a first elastic piece, and the second extension portion comprises a second elastic piece. Wherein the second contact portions of the second differential signal terminals extend beyond the third extension portion and the fourth extension portion, the second wafer comprises an insulating block sleeved on the second contact portions of the second differential signal terminals and a metal shell sleeved on the insulating block, and the metal shell is in contact with the third extension portion and the fourth extension portion. Wherein when the first backplane connector is mated with the second backplane connector, the first contact portions are in contact with the second contact portions, and the first elastic piece and the second elastic piece are respectively in contact with the metal shell.

Compared with the prior art, the second backplane connector of the present disclosure includes a metal shell sleeved on the insulating block. When the first backplane connector is mated with the second backplane connector, both the first elastic piece of the first metal shield and the second elastic piece of the second metal shield are in contact with the metal shell, thereby increasing the grounding shielding area, reducing crosstalk and improving the quality of signal transmission.

BRIEF DESCRIPTION OF DRAWINGS

FIG. **1** is a perspective view of a backplane connector assembly in accordance with an embodiment of the disclosure;

FIG. **2** is a partial perspective exploded view of FIG. **1**;

FIG. **3** is a further perspective exploded view of FIG. **2**;

FIG. **4** is a perspective exploded view of FIG. **3** from another angle;

FIG. **5** is a perspective schematic view of a first backplane connector of the present disclosure when it is mounted to a first circuit board;

FIG. **6** is a side view of FIG. **5**;

FIG. **7** is a partially exploded perspective view of FIG. **5**;

FIG. **8** is a partial perspective exploded view of FIG. **7** from another angle;

FIG. **9** is a partial perspective exploded view of the first backplane connector of the present disclosure, in which the first spacer is separated;

FIG. **10** is a top view of the first spacer in FIG. **9**;

FIG. **11** is a front view of the first backplane connector of the present disclosure after the first spacer in FIG. **9** is removed;

FIG. **12** is a bottom view of FIG. **11**;

FIG. **13** is a partial enlarged view of a frame part A in FIG. **12**;

FIG. **14** is a partial perspective exploded view of the first backplane connector of the present disclosure, in which a first mounting block is separated;

FIG. **15** is a partial perspective exploded view of the first backplane connector of the present disclosure, in which one of the first wafers is separated;

FIG. **16** is a partial perspective exploded view of the first wafer in FIG. **15**;

FIG. **17** is a partially exploded perspective view of FIG. **16** from another angle;

FIG. **18** is a side view of the first insulating frame when separated from the first conductive terminals;

FIG. **19** is a side view of the first metal shield of the first backplane connector;

FIG. **20** is a side view of the second metal shield of the first backplane connector;

FIG. **21** is a partial perspective cross-sectional view taken along line A'-A' in FIG. **5**;

FIG. **22** is a partial enlarged view of a frame part B in FIG. **21**;

FIG. **23** is a schematic cross-sectional view taken along the line A'-A' in FIG. **5**;

FIG. **24** is a partial enlarged view of a frame part C in FIG. **23**;

FIG. **25** is a schematic cross-sectional view taken along line B'-B' in FIG. **5**;

FIG. **26** is a partial enlarged view of a frame part D in FIG. **25**;

FIG. **27** is a front view of a second backplane connector in accordance with an embodiment of the present disclosure;

FIG. **28** is a partially exploded perspective view of the second backplane connector, in which a second spacer is separated;

FIG. **29** is a front view of the second spacer in FIG. **28**;

FIG. **30** is a top view of the second backplane connector with the second spacer in FIG. **28** removed;

FIG. **31** is a partially exploded perspective view of FIG. **28** from another angle;

FIG. **32** is a partial enlarged view of a circled part E in FIG. **31**;

FIG. **33** is a partial perspective exploded view of the second backplane connector, in which a second mounting block is separated;

FIG. **34** is a partial enlarged view of a circled part F in FIG. **33**;

FIG. **35** is a perspective schematic view of a second wafer of the second backplane connector;

FIG. **36** is a partially exploded perspective view of FIG. **35**;

FIG. **37** is a perspective exploded view of an insulating block and a metal shell;

FIG. **38** is a partial enlarged view of a circled part Gin FIG. **36**;

FIG. **39** is a partial enlarged view of a circled part H in FIG. **36**;

FIG. **40** is a partially exploded perspective view of FIG. **36** from another angle;

FIG. **41** is a side view of a third metal shield of the second backplane connector;

FIG. **42** is a side view of a fourth metal shield of the second backplane connector;

FIG. **43** is a plan view after removing the third metal shield and the fourth metal shield in FIG. **40**;

FIG. **44** is a partial perspective cross-sectional view taken along line C'-C' in FIG. **2**;

FIG. **45** is a partial enlarged view of a frame portion I in FIG. **44**;

FIG. **46** is a schematic cross-sectional view taken along line J-J in FIG. **1**;

FIG. **47** is a schematic cross-sectional view taken along line K-K in FIG. **1**;

FIG. **48** is a perspective schematic view of the first wafer of the first backplane connector and the second wafer of the second backplane connector when mating;

FIG. **49** is a partial schematic view of a first circuit board; and

FIG. **50** is a partial schematic view of a second circuit board.

DETAILED DESCRIPTION

Exemplary embodiments will be described in detail here, examples of which are shown in drawings. When referring to the drawings below, unless otherwise indicated, same numerals in different drawings represent the same or similar elements. The examples described in the following exemplary embodiments do not represent all embodiments consistent with this application. Rather, they are merely examples of devices and methods consistent with some aspects of the application as detailed in the appended claims.

The terminology used in this application is only for the purpose of describing particular embodiments, and is not intended to limit this application. The singular forms “a”, “said”, and “the” used in this application and the appended claims are also intended to include plural forms unless the context clearly indicates other meanings.

It should be understood that the terms “first”, “second” and similar words used in the specification and claims of this application do not represent any order, quantity or importance, but are only used to distinguish different components. Similarly, “an” or “a” and other similar words do not mean a quantity limit, but mean that there is at least one; “multiple” or “a plurality of” means two or more than two. Unless otherwise noted, “front”, “rear”, “lower” and/or “upper” and similar words are for ease of description only and are not limited to one location or one spatial orientation. Similar words such as “include” or “comprise” mean that elements or objects appear before “include” or “comprise” cover elements or objects listed after “include” or “comprise” and their equivalents, and do not exclude other elements or objects. The term “a plurality of” mentioned in the present disclosure includes two or more.

Hereinafter, some embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. In the case of no conflict, the following embodiments and features in the embodiments can be combined with each other.

Referring to FIGS. **1** and **2**, an embodiment of the present disclosure discloses a backplane connector assembly which includes a first backplane connector **100**, a second backplane connector **200** for mating with the first backplane connector **100**, a first circuit board **301** mounted with the first backplane connector **100**, and a second circuit board **302** mounted with the second backplane connector **200**. In the illustrated embodiment of the present disclosure, the first backplane connector **100** and the second backplane connector **200** are mated in an orthogonal manner. The first circuit board **301** is perpendicular to the second circuit board **302**.

Referring to FIGS. **3** to **6**, the first backplane connector **100** includes a first header **1**, a plurality of first wafers **2** assembled to the first header **1**, a first spacer **3** fixed at a rear end of the plurality of first wafers **2**, and a first mounting block **4** mounted at a bottom end of the plurality of first wafers **2**.

Referring to FIGS. **7** and **8**, in an embodiment of the present disclosure, the first header **1** is made of insulating material. The first header **1** includes a first body portion **11**, a first wall portion **12** extending rearwardly from one side of the first body portion **11**, and a second wall portion **13** extending rearwardly from the other side of the first body portion **11**. The first wall portion **12** and the second wall portion **13** are in parallel. The first body portion **11** includes a mating surface **111** and a plurality of first terminal receiving grooves **112** extending through the mating surface **111**. As shown in FIGS. **7** and **8**, in the illustrated embodiment of the present disclosure, the first terminal receiving grooves **112** are disposed in multiple rows along a left-right direction, wherein two adjacent rows of first terminal receiving grooves **112** are staggered in a vertical direction. That is, in two adjacent rows of first terminal receiving grooves **112**, the first terminal receiving grooves **112** at corresponding positions are not in alignment in the left-right direction. The first wall portion **12** includes a plurality of first slots **121** and a plurality of first locking grooves **122** communicating with corresponding first slots **121**. The second wall portion **13** includes a plurality of second slots **131** and a plurality of second locking grooves **132** communicating with corresponding second slots **131**. The first locking grooves **122** and the second locking grooves **132** extend outwardly along the vertical direction through the first wall portion **12** and the second wall portion **13**, respectively. The first locking grooves **122** and the second locking grooves **132** are adapted to lock with the first wafers **2** in order to prevent the first wafers **2** from being separated from the first header **1**. The first slot **121**, the second slot **131** and the first terminal receiving grooves **112** which are in alignment with each other along the vertical direction are used to receive the same first wafer **2**.

Besides, referring to FIG. **8**, the first header **1** also includes a plurality of positioning protrusions **14** extending forwardly from the first wall portion **12** and the second wall portion **13**, respectively. The positioning protrusions **14** protrude beyond the mating surface **111**. Each positioning protrusion **14** includes a guiding inclined surface **141** formed at an end thereof.

Referring to FIG. **15**, the first wafer **2** includes a first insulating frame **21**, a plurality of first conductive terminals **22** fixed to the first insulating frame **21**, a first metal shield **23** fixed on one side of the first insulating frame **21**, and a second metal shield **24** fixed on the other side of the first insulating frame **21**.

Referring to FIG. **18**, each first insulating frame **21** is roughly frame-shaped and includes a first rear wall **211**, a first front wall **212** opposite to the first rear wall **211**, a first top wall **213** connecting one end of the first rear wall **211** and one end of the first front wall **212**, a first bottom wall **214** connecting the other end of the first rear wall **211** and the other end of the first front wall **212**, and a plurality of connecting walls **215**. The connecting walls **215** are capable of enhancing the structural strength of the frame. The first rear wall **211** includes a first protrusion **2111** and a second protrusion **2112** which protrude rearwardly. The first protrusion **2111** and the second protrusion **2112** are spaced apart from each other along the vertical direction. The first protrusion **2111** and the second protrusion **2112** are in alignment with each other along the vertical direction. The first protrusion **2111** includes a first constriction portion **2113**, and the second protrusion **2112** includes a second constriction portion **2114**. In the illustrated embodiment of the present disclosure, the first insulating frame **21** includes a first hollow portion **210**. The connecting walls **215** include a first connecting wall **2151** connecting the first top wall **213** and the first bottom wall **214**, and a second connecting wall **2152** connecting the first rear wall **211** and the first bottom wall **214**. The first connecting wall **2151** and the second connecting wall **2152** are exposed in the first hollow portion **210**. The first top wall **213** includes a first locking protrusion **2131** for being inserted into the first locking groove **122**. The first bottom wall **214** includes a second locking protrusion **2141** for being inserted into the second locking groove **132**.

Referring to FIGS. **16** to **18**, the first insulating frame **21** further includes a plurality of posts **216** for fixing the first metal shield **23** and the second metal shield **24**. In the illustrated embodiment of the present disclosure, the posts **216** are disposed on the first bottom wall **214**, the first connecting wall **2151**, the second connecting wall **2152** and the first front wall **212**. The first metal shield **23** and the second metal shield **24** are located on opposite sides of the first insulating frame **21**, respectively. The posts **216** include a plurality of first posts **2161** and a plurality of second posts **2162**. The first posts **2161** and the second posts **2162** are located on opposite sides of the first insulating frame **21**, respectively, so as to be fixed and positioned with the first metal shield **23** and the second metal shield **24**.

Referring to FIG. **18**, each first conductive terminal **22** includes a first contact portion **221**, a first tail portion **222** and a first connection portion **223** connecting the first contact portion **221** and the first tail portion **222**. Some of the first contact portions **221** are used to electrically connect with the second backplane connector **200**. The first tail portions **222** are used for being mounted to the first circuit board **301**. In the illustrated embodiment of the present disclosure, the first contact portion **221** is substantially perpendicular to the first tail portion **222**. The first connection portion **223** is of a curved configuration.

Each group of first conductive terminals **22** include a plurality of first ground terminals G**1**, a plurality of second ground terminals G**2**, and a plurality of first signal terminals S**1**. In the illustrated embodiment of the present disclosure, two adjacent first signal terminals S**1** form a pair of first differential signal terminals. Each pair of first differential signal terminals are located between one first ground terminal G**1** and one second ground terminal G**2**. That is, each group of first conductive terminals **22** are arranged in a manner of G**1**-S**1**-S**1**-G**2**, which is beneficial to improve the quality of signal transmission. The first differential signal terminals are narrow-side coupling or wide-side coupling. A width of the first ground terminal G**1** and a width the second ground terminal G**2** are greater than a width of each first signal terminal S**1** which is located between the first ground terminal G**1** and the second ground terminal G**2**. Therefore, it is beneficial to increase the shielding area and improve the shielding effect.

In the illustrated embodiment of the present disclosure, the first connection portions **223** of the first conductive terminals **22** are partially insert-molded with the first insulating frame **21**. Each first connection portion **223** of the first signal terminal S**1** has a narrowed portion **2230** insert-molded with the first insulating frame **21** so as to adjust the impedance of the first signal terminal S**1** for achieving impedance matching. In the illustrated embodiment of the present disclosure, the first contact portion **221** of the first signal terminal S**1** is substantially needle-shaped. The first contact portion **221** of the first ground terminal G**1** and the first contact portion **221** of the second ground terminal G**2** are substantially rectangular-shaped. The first contact portion **221** of the first signal terminal S**1** and the first connection portion **223** of the first conductive terminal **22** are both coplanar, which means they are located in a same first plane (for example, a horizontal plane). It should be noted that the technical term "coplanar" used in the present disclosure is intended to indicate that related components are substantially flush, which includes situations of incomplete coplanarity caused by manufacturing tolerances. In the illustrated embodiment of the present disclosure, the first ground terminal G1 includes a first torsion portion **2241** connecting its first contact portion **221** and its first tail portion **222**, so that the first contact portion **221** of the first ground terminal G1 is located in a second plane (for example, a vertical plane) perpendicular to the first plane. The second ground terminal G2 includes a second torsion portion **2242** connecting its first contact portion **221** and its first tail portion **222**, so that the first contact portion **221** of the second ground terminal G2 is also located in the second plane (for example, the vertical plane) perpendicular to the first plane. The first contact portion **221** of the first ground terminal G1 and the first contact portion **221** of the second ground terminal G2 are parallel to each other. Each first connection portion **223** of the first ground terminals G1 and the second ground terminals G2 further includes a slot **2231** adjacent to its corresponding first tail portion **222**. The slot **2231** extend through a bottom edge of the first connection portion **223**, so that the first connection portions **223** is divided into a first end portion **2232** and a second end portion **2233**.

Referring to FIGS. **24** and **26**, in the illustrated embodiment of the present disclosure, the first contact portion **221** and the first connection portion **223** of the first ground terminal G1 have a first wide surface **221***a* and a first narrow surface **221***b* perpendicular to the first wide surface **221***a*. The first contact portion **221** and the first connection portion **223** of the second ground terminal G2 have a second wide surface **221***c* and a second narrow surface **221***d* perpendicular to the second wide surface **221***c*. The first connection portions **223** of each pair of first differential signal terminals are located between the first narrow surface **221***b* of the first ground terminal G1 and the second narrow surface **221***d* of the second ground terminal G2 which are located on opposite sides of the first connection portions **223** of each pair of first differential signal terminals. The first contact portions **221** of each pair of first differential signal terminals are located between the first wide surface **221***a* of the first ground terminal G1 and the second wide surface **221***c* of the second ground terminal G2 which are located on opposite sides of the first contact portions **221** of each pair of first differential signal terminals. In the illustrated embodiment of the present disclosure, a width of the first wide surface **221***a* and a width of the second wide surface **221***c* are greater than a width of each first contact portion **221** of the first signal terminals S1, thereby better shielding can be provided for the first contact portions **221** of the first signal terminals S1.

In the illustrated embodiment of the present disclosure, the first metal shield **23** and the second metal shield **24** are symmetrically disposed on opposite sides of the first insulating frame **21**. Referring to FIGS. **17** and **19**, the first metal shield **23** includes a first main body portion **231** and a first extension portion **232** extending from the first main body portion **231**. The first main body portion **231** is located on one side of the first connection portions **223** of the first conductive terminals **22**. The first extension portion **232** is located on one side of the first contact portions **221** of the first conductive terminals **22**. In the illustrated embodiment of the present disclosure, the first extension portion **232** and the first main body portion **231** are located in different planes, in which the first extension portion **232** is farther away from the second metal shield **24** than the first main body portion **231**. The first main body portion **231** includes a plurality of first mounting holes **2311** for mating with the plurality of first posts **2161**. The first posts **2161** are fixed and positioned in the first mounting holes **2311** by soldering, thereby the fixing and positioning of the first metal shield **23** and the first insulating frame **21** are realized. The first main body **231** includes a plurality of ribs **233**. The ribs **233** include a plurality of first ribs **2331** protruding toward the first ground terminals G1 and a plurality of second ribs **2332** protruding toward the second ground terminals G2. The first ribs **2331** corresponding to the first ground terminal G1 are disposed along an extending direction of the first connection portion **223** of the first ground terminal G1. The second ribs **2332** corresponding to the second ground terminal G2 are disposed along an extending direction of the first connection portion **223** of the second ground terminal G2. In the illustrated embodiment of the present disclosure, the first ribs **2331** and the second ribs **2332** are formed by stamping the first main body portion **231**. The first ribs **2331** and the second ribs **2332** protrude toward the second metal shield **24**. The first ribs **2331** and the second ribs **2332** are discontinuously disposed along the extending direction of the first connection portion **223** of the first ground terminal G1 and the extending direction of the first connection portion **223** of the second ground terminal G2, respectively, so as to achieve multi-position contact. In order to improve the reliability of the contact between the first metal shield **23** and the first ground terminals G1 and the second ground terminals G2. In the illustrated embodiment of the present disclosure, referring to FIG. **22**, a wall thickness of the first rib **2331**, a wall thickness of the second rib **2332**, and a wall thickness of a portion of the first main body **231** located between the first rib **2331** and the second rib **2332** are the same.

The first extension portion **232** includes a plurality of first bulges **2321** protruding toward the corresponding first contact portions **221** of the first ground terminals G1, a plurality of second bulges **2322** protruding toward the corresponding first contact portions **221** of the second ground terminals G2, and a plurality of first elastic pieces **2323** each of which is located between adjacent first bulge **2321** and second bulge **2322**. The first elastic pieces **2323** extend along directions toward the first main body portion **231**. Each first elastic piece **2323** has an arc-shaped contact portion **2324**. In the illustrated embodiment of the present disclosure, the first extension portion **232** further includes two first protruding tabs **2325** located at opposite sides of each first elastic piece **2323**. The first protruding tabs **2325** and the first elastic pieces **2323** extend along opposite directions. The first protruding tabs **2325** protrude sidewardly to contact the adjacent first wafer **2** so as to improve the shielding effect. In the illustrated embodiment of the present disclosure, referring to FIG. **26**, a wall thickness of the first bulge **2321**, a wall thickness of the second bulge **2322** and a wall thickness of a portion of the first extension portion **232** located between the first bulge **2321** and the second bulge **2322** are the same.

In addition, the first main body portion **231** further includes a plurality of first protruding pieces **2312** extending downwardly from a bottom edge thereof and a plurality of connecting pieces **2313** each of which is located between two adjacent first protruding pieces **2312**. By providing the first protruding pieces **2312**, the shielding length can be extended, and the shielding effect of the first signal terminals S1 can be improved. In the illustrated embodiment of the present disclosure, the connecting pieces **2313** are stamped from the first main body portion **231**. Each connecting piece **2313** straddles the corresponding slot **2231** to connect one side of the first end portion **2232** and the second end portion

2233 of the same first ground terminal G**1**, thereby improving the shielding effect. At the same time, each connecting piece **2313** can also connect one side of the first end portion **2232** and the second end portion **2233** of the same second ground terminal G**2**, thereby improving the shielding effect.

Similarly, referring to FIGS. **16** and **20**, the second metal shield **24** includes a second main body portion **241** and a second extension portion **242** extending from the second main body portion **241**. The second main body portion **241** is located on the other side of the first connection portions **223** of the first conductive terminals **22**. The second extension portion **242** is located on the other side of the first contact portions **221** of the first conductive terminals **22**. In the illustrated embodiment of the present disclosure, the second extension portion **242** and the second main body portion **241** are located in different planes, in which the second extension portion **242** is farther away from the first metal shield **23** than the second main body portion **241**. The second main body portion **241** includes a plurality of second mounting holes **2411** for mating with the plurality of second posts **2162**. The second posts **2162** are fixed and positioned in the second mounting holes **2411** by soldering, so as to realize the fixing and positioning of the second metal shield **24** and the first insulating frame **21**. The second main body **241** includes a plurality of ribs **243**. The ribs **243** include a plurality of third ribs **2431** protruding toward the first ground terminals G**1** and a plurality of fourth ribs **2432** protruding toward the second ground terminals G**2**. The third ribs **2431** are disposed along the extending direction of the first connection portion **223** of the first ground terminal G**1**. The fourth ribs **2432** are disposed along the extending direction of the first connection portion **223** of the second ground terminal G**2**. In the illustrated embodiment of the present disclosure, the third ribs **2431** and the fourth ribs **2432** are formed by stamping the second main body portion **241**. The third ribs **2431** and the fourth ribs **2432** protrude toward the first metal shield **23**. The third ribs **2431** and the fourth ribs **2432** are discontinuously disposed along the extending direction of the first connection portion **223** of the first ground terminal G**1** and the extending direction of the first connection portion **223** of the second ground terminal G**2**, respectively, so as to achieve multi-position contact. As a result, the reliability of the contact between the second metal shield **24** and the first ground terminals G**1** and the second ground terminals G**2** is improved. In the illustrated embodiment of the present disclosure, a wall thickness of the third rib **2431**, a wall thickness of the fourth rib **2432** and a wall thickness of a portion of the second main body **241** located between the third rib **2431** and the fourth rib **2432** are the same. In an embodiment of the present disclosure, soldering is performed on the surfaces of the ribs **233** and the ribs **243** to solder the ribs **233** and the ribs **243** to the first ground terminals G**1** and the second ground terminals G**2**. For example, soldering is performed on the surfaces of the first ribs **2331**, the second ribs **2332**, the third ribs **2431** and the fourth ribs **2432** in order to solder the first ribs **2331**, the second ribs **2332**, the third ribs **2431** and the fourth rib **2432** to the first ground terminals G**1** and the second ground terminals G**2**. The soldering method is at least one of spot soldering, laser soldering and ultrasonic soldering.

The second extension portion **242** includes a plurality of third bulges **2421** protruding toward the first contact portions **221** of the first ground terminals G**1**, a plurality of fourth bulges **2422** protruding toward the first contact portions **221** of the second ground terminals G**2**, and a plurality of second elastic pieces **2423** each of which is located between adjacent third bulge **2421** and fourth bulge **2422**. The second elastic pieces **2423** extend along directions toward the second main body portion **241**. Each second elastic piece **2423** has an arc-shaped contact portion **2424**. In the illustrated embodiment of the present disclosure, the second extension portion **242** further includes two second protruding tabs **2425** located at opposite sides of each second elastic piece **2423**. The second protruding tabs **2425** and the second elastic pieces **2423** extend along opposite directions. The second protruding tabs **2425** protrude sidewardly to contact the adjacent first wafer **2** so as to improve the shielding effect. In the illustrated embodiment of the present disclosure, a wall thickness of the third bulge **2421**, a wall thickness of the fourth bulge **2422**, and a wall thickness of a portion of the second extension portion **242** located between the third bulge **2421** and the fourth bulge **2422** are the same.

In addition, the second main body portion **241** further includes a plurality of second protruding pieces **2412** extending downwardly from a bottom edge thereof, and a plurality of connecting pieces **2413** each of which is located between two adjacent second protruding pieces **2412**. By providing the second protruding pieces **2412**, the shielding length can be extended, and the shielding effect on the first signal terminals S**1** can be improved. In the illustrated embodiment of the present disclosure, the connecting pieces **2413** are stamped from the second main body portion **241**, and the connecting piece **2413** straddles the corresponding slot **2231** so as to connect the other side of the first end portion **2232** and the second end portion **2233** of the same first ground terminal G**1** so as to improve the shielding effect. At the same time, the connecting piece **2413** can also connect the other side of the first end portion **2232** and the second end portion **2233** of the same second ground terminal G**2** so as to improve the shielding effect.

Referring to FIGS. **21** and **22**, along a length of the first connection portion **223** of the first conductive terminal **22**, the first rib **2331** of the first metal shield **23** and the third rib **2431** of the second metal shield **24** respectively contact two opposite sides of the first connection portion **223** of the first ground terminal G**1**, and the second rib **2332** of the first metal shield **23** and the fourth rib **2432** of the second metal shield **24** respectively contact two opposite sides of the first connection portion **223** of the second ground terminal G**2**, thereby forming a shielding cavity **26** surrounding the outer periphery of the first connection portions **223** of each pair of first differential signal terminals. In the illustrated embodiment of the present disclosure, the first rib **2331** and the third rib **2431** respectively contact the first wide surface **221***a* of the first connection portion **223** of the first ground terminal G**1**. The second rib **2332** and the fourth rib **2432** respectively contact the second wide surface **221***c* of the first connection portion **223** of the second ground terminal G**2**. In the illustrated embodiment of the present disclosure, the shielding cavity **26** is jointly formed by the first main body portion **231**, the second main body portion **241**, the first ground terminal G**1** and the second ground terminal G**2**. The first connection portion **223** of the first ground terminal G**1** includes a first tab portion **2234** protruding into the shielding cavity **26**. The first connection portion **223** of the second ground terminal G**2** includes a second tab portion **2235** protruding into the shielding cavity **26**. The first connection portions **223** of the first differential signal terminals are located between the first tab portion **2234** and the second tab portion **2235**. In the illustrated embodiment of the present disclosure, there are a plurality of the shielding cavities **26** which are disposed along an arrangement direction of each group of the first conductive terminals **22**. Two adjacent shielding cavities **26** share a single first ground terminal G**1** or a single second ground terminal G**2**. In addition, a part of the shared first ground terminal G**1** protrudes into one shielding cavity **26**, and another part of the shared first ground terminal G**1** protrudes into another shielding cavity **26**.

Referring to FIG. **26**, in the length of the first contact portion **221** of the first conductive terminal **22**, the first bulge **2321** of the first metal shield **23** and the third bulge **2421** of the second metal shield **24** respectively contact two opposite side surfaces of the first contact portion **221** of the first ground terminal G**1**, and the second bulge **2322** of the first metal shield **23** and the fourth bulge **2422** of the second metal shield **24** respectively contact two opposite side surfaces of the first contact portion **221** of the second ground terminal G**2**. In the illustrated embodiment of the present disclosure, the first bulge **2321** of the first metal shield **23** and the third bulge **2421** of the second metal shield **24** respectively contact the first narrow surfaces **221***b* of the first contact portion **221** of the first ground terminal G**1**. The second bulge **2322** of the first metal shield **23** and the fourth bulge **2422** of the second metal shield **24** respectively contact the second narrow surfaces **221***d* of the first contact portion **221** of the second ground terminal G**2**. The first extension portion **232**, the second extension portion **242**, the first ground terminal G**1** and the second ground terminal G**2** jointly form a shielding space **27** for accommodating the corresponding first contact portions **221** of the first differential signal terminals. The first elastic piece **2323** and the second elastic piece **2423** extend into the shielding space **27**. In the illustrated embodiment of the present disclosure, there are multiple shielding spaces **27** which are disposed along a stacking direction of each group of the first conductive terminals **22**. Two adjacent shielding spaces **27** share a single first ground terminal G**1** or a single second ground terminal G**2**. One first wide surface **221***a* of the first contact portion **221** of the shared first ground terminal G**1** is exposed to the shielding space **27**, and the other first wide surface **221***a* of the first contact portion **221** of the shared first ground terminal G**1** is exposed to an adjacent shielding space **27**. Similarly, a first wide surface **221***c* of the first contact portion **221** of the shared second ground terminal G**2** is exposed to the adjacent shielding space **27**, and the other wide surface **221***c* of the first contact portion **221** of the shared second ground terminal G**2** is exposed to another adjacent shielding space **27**.

In the illustrated embodiment of the present disclosure, there are multiple first wafers **2** of the first backplane connector **100**, and the terminal arrangement of two adjacent first wafers **2** are staggered. Correspondingly, the shielding cavities **26** at the same position of two adjacent first wafers **2** are staggered (referring to FIG. **23**), and the shielding spaces **27** at the same position of two adjacent first wafers **2** are staggered (referring to FIG. **25**).

Referring to FIGS. **9** to **11**, in the illustrated embodiment of the present disclosure, the first spacer **3** is made of metal material or insulating material. The first spacer **3** includes a body portion **31** and a protruding piece **32** extending from the body portion **31**. The body portion **31** includes a plurality of slots **311** corresponding to the first protrusions **2111**. The protruding piece **32** includes a plurality of slits **321** corresponding to the second protrusions **2112**, so that the protruding piece **32** is roughly comb-shaped. Each slot **311** is a closed slot, which means the circumference of the slot **311** is surrounded by the body portion **31**. Each slit **321** is a non-closed slit, which means one end of the slit **321** is opened. The slit **321** is in alignment with the corresponding slot **321** along the vertical direction. Each slot **311** includes a first slot **3111** and a second slot **3112** which has a width larger than that of the first slot **3111**. The first slot **3111** is located above the second slot **3112** and communicates with the corresponding second slot **3112**. The slit **321** is located below the corresponding second slot **3112**.

When assembling the first spacer **3** to the plurality of first wafers **2**, firstly, the second slots **3112** of the first spacer **3** are corresponding to the first protrusions **2111** along the extending direction of the first contact portions **221**, and make the first protrusions **2111** pass through the second slots **3112**. Then, the first spacer **3** is moved downwardly along the extending direction of the first tail portions **222**, so that the first constriction portions **2113** are tightly clamped in the corresponding first slots **3111**, thereby the first wafers **2** can be combined as a whole. This can prevent looseness and prevent the first wafers **2** from being separated from the first spacer **3** along the extending direction of the first contact portions **221**. At the same time, the second constriction portions **2114** of the second protrusions **2112** are tightly clamped in the slits **321** so to achieve double fixation and improve reliability.

Referring to FIGS. **12** and **13**, the first mounting block **4** includes a plurality of first through holes **41** for allowing the first tail portions **222** of the first ground terminals G**1** to pass through, a plurality of second through holes **42** for allowing the first tail portions **222** of the second ground terminals G**2** to pass through, and a plurality of slots **43** for allowing the first tail portions **222** of the first signal terminals S**1** to pass through. For a group of first conductive terminals **22** arranged in the manner of G**1**-S**1**-S**1**-G**2**, the first through holes **41** and the second through holes **42** are located on opposite sides of the slot **43** and are in communication with the slot **43**. A width of the slot **43** is greater than either a width of the first through hole **41** or a width of the second through hole **42**, so that the first tail portions **222** of the first differential signal terminals can be completely exposed in the slot **43**. The first mounting block **4** further includes a first abutting surface **431** located on one side of the slot **43** and a second abutting surface **432** located on the other side of the slot **43**. The first abutting surface **431** and the second abutting surface **432** are disposed opposite to each other. Both the first protruding pieces **2312** of the first metal shield **23** and the second protruding pieces **2412** of the second metal shield **24** are at least partially inserted into the slots **43**. In the illustrated embodiment of the present disclosure, the first protruding piece **2312** of the first metal shield **23** abuts against the first abutting surface **431**. The second protruding piece **2412** of the second metal shield **24** abuts against the second abutting surface **432**. Along an arrangement direction of a group of first conductive terminals **22** which are arranged in the manner of G**1**-S**1**-S**1**-G**2**, the first tail portions **222** of the first differential signal terminals are located between the first tail portion **222** of the first ground terminal G**1** and the first tail portion **222** of the second ground terminal G**2**. Along a direction perpendicular to the arrangement direction, the first tail portions **222** of the first differential signal terminals are located between the first protruding piece **2312** of the first metal shield **23** and the second protruding piece **2412** of the second metal shield **24**. This arrangement improves the shielding effect of the first differential signal terminals. Preferably, the first mounting block **4** is electroplated plastic which can further improve the shielding effect.

Referring to FIG. **14**, the first mounting block **4** further includes a first mounting wall **44** and a plurality of first side walls **45** perpendicular to the first mounting wall **44**. The plurality of first side walls **45** are spaced apart and parallel to each other. A plurality of first slots **40** for insertion of the first wafers **2** are formed between each two adjacent first side walls **45**. A top of the first side wall **45** includes a first inclined surface **451** communicating with the first slot **40** and acting as an insertion guide. The first inclined surfaces **451** of the two first side walls **45** located on opposite sides of the first slot **40** have different inclination directions so as to form a bell-mouth opening. The bell-mouth opening is adapted to facilitate the insertion of the first wafers **2** or to facilitate to mount the first mounting block **4** to the first wafers **2**. An inner side of the first side wall **45** also includes a plurality of first positioning grooves **452** communicating with the first slot **40** and used for positioning the first post **2161** and the second post **2162** which are located on the first bottom wall **214** of the first insulating frame **21**.

Referring to FIGS. **3** and **4**, the second backplane connector **200** includes a second header **5**, a plurality of second wafers **6** assembled to the second header **5**, a second spacer **7** holding on one side of the plurality of second wafers **6**, and a second mounting block **8** holding the other side of the plurality of second wafers **6**.

The second header **5** is made of insulating material. The second header **5** includes a second body portion **51**, a wall portion **52** extending from the second body portion **51** to one end, and a frame portion **53** extending from the second body portion **51** to the other end. The second body portion **51** includes a plurality of second terminal receiving grooves **511** extending forwardly and rearwardly. In the illustrated embodiment of the present disclosure, the second terminal receiving grooves **511** are disposed in multiple rows along a left-right direction. Two adjacent rows of second terminal receiving grooves **511** are staggered in a vertical direction. That is, in two adjacent rows of the second terminal receiving grooves **511**, the second terminal receiving grooves **511** at corresponding positions are not in alignment with each other in the left-right direction. The wall portion **52** includes a first wall portion **521** and a second wall portion **522** disposed opposite to each other. The first wall portion **521** includes a plurality of first slots **5211**. The second wall portion **522** includes a plurality of second slots **5221**. The first slot **5211** and the second slot **5221**, which are in alignment with each other along the vertical direction, together with the second terminal receiving slot **511** corresponding to the first slot **5211** and the second slot **5221** are jointly used for receiving the same second wafer **6**.

The frame portion **53** includes a first extension wall **531**, a second extension wall **532** opposite to the first extension wall **531**, a top wall **533** connecting one end of the first extension wall **531** and one end of the second extension wall **532**, a bottom wall **534** connecting the other end of the first extension wall **531** and the other end of the second extension wall **532**, and a receiving space **535** jointly enclosed by the first extension wall **531**, the second extension wall **532**, the top wall **533** and the bottom wall **534**. The receiving space **535** is used for at least partially accommodating the first backplane connector **100**. Specifically, in the illustrated embodiment of the present disclosure, both the first extension wall **531** and the second extension wall **532** include a plurality of positioning grooves **530** disposed at intervals. The receiving space **535** is used for accommodating the first header **1**. The positioning grooves **530** are used for accommodating the corresponding positioning protrusions **14** so as to improve the mating accuracy of the first backplane connector **100** and the second backplane connector **200**.

Referring to FIGS. **35** and **36**, each second wafer **6** includes a second insulating frame **61**, a plurality of second conductive terminals **62** insert-molded with the second insulating frame **61**, a third metal shield **63** fixed on one side of the second insulating frame **61**, and a fourth metal shield **64** fixed on the other side of the second insulating frame **61**.

Referring to FIG. **43**, the second insulating frame **61** is roughly frame-shaped. The second insulating frame **61** includes a second rear wall **611**, a second front wall **612** opposite to the second rear wall **611**, a second top wall **613** connecting one end of the second rear wall **611** and one end of the second front wall **612**, a second bottom wall **614** connecting the other end of the second rear wall **611** and the other end of the second front wall **612**, and a plurality of connecting walls **615**. The connecting walls **615** can enhance the structural strength of the frame. The second rear wall **611** includes a first protrusion **6111**. The first protrusion **6111** includes a first constriction portion **6113**. In the illustrated embodiment of the present disclosure, the second insulating frame **61** includes a second hollow portion **610**. The connecting walls **615** include a third connecting wall **6151** connecting the second top wall **613** and the second bottom wall **614**, and a fourth connecting wall **6152** connecting the second rear wall **611** and the second bottom wall **614**. The third connecting wall **6151** and the fourth connecting wall **6152** are exposed in the second hollow portion **610**.

Referring to FIG. **36**, the second front wall **612** includes a plurality of protruding blocks **6121** disposed at intervals and a groove **6122** located between two adjacent protruding blocks **6121**. The protruding block **6121** includes an opening **6123** to partially expose corresponding second conductive terminal **62** in order to adjust the impedance.

The second insulating frame **61** further includes a plurality of posts **616** for fixing and positioning the third metal shield **63** and the fourth metal shield **64**. In the illustrated embodiment of the present disclosure, the posts **616** are disposed on the second bottom wall **614**, the third connecting wall **6151** and the fourth connecting wall **6152**. The third metal shield **63** and the fourth metal shield **64** are located on two sides of the second insulating frame **61**, respectively. The posts **616** include a plurality of third posts **6161** and a plurality of fourth posts **6162**. The third posts **6161** and the fourth posts **6162** are located on opposite sides of the second insulating frame **61** so to be fixed to the third metal shield **63** and the fourth metal shield **64**, respectively.

Each second conductive terminals **62** includes a second contact portion **621**, second tail portion **622**, and a second connection portion **623** connecting the second contact portion **621** and the second tail portion **622**. Some of the second contact portions **621** are used to electrically connect with the first backplane connector **100**. The second tail portions **622** are used to be mounted to the second circuit board **302**. In the illustrated embodiment of the present disclosure, the second contact portion **621** is substantially perpendicular to the second tail portion **622**. The second connection portion **623** is of a curved configuration.

Each group of second conductive terminals **62** include a plurality of third ground terminals G**3**, a plurality of fourth ground terminals G**4**, and a plurality of second signal terminals S**2**. In the illustrated embodiment of the present disclosure, two adjacent second signal terminals S**2** form a pair of second differential signal terminals. Each pair of second differential signal terminals are located between one third ground terminal G**3** and one fourth ground terminal G**4**. That is, each group of second conductive terminals **62** are disposed in a manner of G**3**-S**2**-S**2**-G**4**, which is beneficial to improve the quality of signal transmission. The second differential signal terminals are narrow-side coupling or wide-side coupling. A width of the third ground terminal G**3** and a width of the fourth ground terminal G**4** are greater than a width of each second signal terminal S**2** therebetween, which is beneficial to increase the shielding area and improve the shielding effect.

In the illustrated embodiment of the present disclosure, the second connection portions **623** of the second conductive terminals **62** are partially insert-molded with the second insulating frame **61**. The second connection portion **623** of the second signal terminal S**2** includes a narrowed portion **6230** insert-molded with the second insulating frame **61** for adjusting the impedance of the second signal terminal S**2** in order to achieve impedance matching. Referring to FIG. **38**, in the illustrated embodiment of the present disclosure, each second contact portion **621** of the second signal terminal S**2** has a two-half structure, which includes a first contact section **6211**, a second contact section **6212**, and a slot **6210** located between the first contact section **6211** and the second contact section **6212**. When the needle-shaped first contact portion **221** of the first signal terminal S**1** of the first backplane connector **100** is inserted between the first contact section **6211** and the second contact section **6212**, the first contact section **6211** and the second contact section **6212** can be elastically deformed in order to improve the contact reliability. The first contact section **6211** includes a first arc-shaped surface, and the second contact section **6212** includes a second arc-shaped surface. The first arc-shaped surface and the second arc-shaped surface are disposed opposite to each other so as to jointly form a mating hole **6215** for receiving the first contact portion **221** of the first signal terminal S**1** of the first backplane connector **100**. The two second signal terminals S**2** constituting a pair of second differential signal terminals, their second connection portions **623** are disposed in a first direction (for example, a vertical direction), and their second contact portions **621** are disposed in a direction (for example, a left-right direction) perpendicular to the first direction.

Each second contact portion **621** of the third ground terminal G**3** and the fourth ground terminal G**4** is substantially flat. The second contact portion **621** of the third ground terminal G**3**, the second contact portion **621** of the fourth ground terminal G**4**, and the second connection portions **623** of the second conductive terminals **62** are all coplanar. As shown in FIG. **39**, each second connection portion **623** of the third ground terminal G**3** and the fourth ground terminal G**4** further includes a slot **6231** adjacent to its corresponding the second tail portion **622**. The slot **6231** extends through a bottom edge of the second connection portion **623**, so that the second connection portion **623** is divided into a first end portion **6232** and a second end portion **6233**. Each of the first end portion **6232** and the second end portion **6233** is connected with one second tail portion **622**. The second contact portion **621** of the third ground terminal G**3** and the second contact portion **621** of the fourth ground terminal G**4** both extend into the corresponding grooves **6122** to facilitate contact with the third metal shield **63** and the fourth metal shield **64**. The second contact portions **621** of the second signal terminals S**2** extend beyond the protruding block **6121**.

In the illustrated embodiment of the present disclosure, the second contact portion **621** and the second connection portion **623** of the third ground terminal G**3** both include a first wide surface **621***a* and a first narrow surface **621***b* perpendicular to the first wide surface **621***a*. The second contact portion **621** and the second connection portion **623** of the fourth ground terminal G**4** both include a second wide surface **621***c* and a second narrow surface **621***d* perpendicular to the second wide surface **621***c*. The second connection portions **623** of each pair of second differential signal terminals are located between the first narrow surface **621***b* of the third ground terminal G**3** and the second narrow surface **621***d* of the fourth ground terminal G**4** which are located on opposite sides of the second connection portions **623** of each pair of second differential signal terminals.

Referring to FIGS. **34**, **37**, and **40**, each group of second wafers **6** further includes an insulating block **65** sleeved on the second contact portions **621**, and a metal shell **66** sleeved on the insulating block **65**. Each insulating block **65** includes two through holes **651** into which the second contact portions **621** of the second signal terminals S**2** are inserted, and a mating surface **652** at an end thereof. In the illustrated embodiment of the present disclosure, the insulating block **65** is substantially cuboid shaped. Correspondingly, the metal shell **66** is substantially cuboid shaped. In an embodiment of the present disclosure, the insulating block **65** is fixed in the metal shell **66**, for example, by assembling.

Referring to FIGS. **34** and **37**, the metal shell **66** includes a first side wall **661**, a second side wall **662**, a third side wall **663** and a fourth side wall **664**. The first side wall **661** is opposite to the third side wall **663**. The second side wall **662** is opposite to the fourth side wall **664**. An area of the first side wall **661** and the third side wall **663** is larger than an area of the second side wall **662** and the fourth side wall **664**. The ends of the first side wall **661**, the second side wall **662**, the third side wall **663** and the fourth side wall **664** all include a deflection portion **665** which is bent inwardly. By providing the deflection portions **665**, a constricted portion can be formed at an end of the metal shell **66**, so that outer surfaces **6651** of the deflection portions **665** can guide the second wafer **6** to be assembled to the second header **5**, and even guide the metal shell **66** to be inserted into the shielding space **27** of the first backplane connector **100**. In addition, in order to better restrict the insulating block **65**, the second side wall **662** and the fourth side wall **664** further include restriction protrusions **6621**, **6641** formed by stamping the second side wall **662** and the fourth side wall **664** inwardly. The restriction protrusions **6621**, **6641** are used to mate with the insulating block **65** so as to prevent the insulating block **65** from being drawn out of the metal shell **66**.

In the illustrated embodiment of the present disclosure, the metal shell **66** further includes a first extension piece **6611** extending from the first side wall **661** and a pair of first slots **6612** located on opposite sides of the first extension piece **6611**. The metal shell **66** further includes a second extension piece **6631** extending from the third side wall **663** and a pair of second slots **6632** located on opposite sides of the second extension piece **6631**. The first extension piece **6611** is in vertical contact with the second contact portion **621** of the third ground terminal G**3** so as to improve the shielding effect. The second extension piece **6631** is in vertical contact with the second contact portion **621** of the fourth ground terminal G**4** so as to improve the shielding effect. In the illustrated embodiment of the present disclosure, the first extension piece **6611** and the second extension piece **6631** are deflected outwardly and then extend, so that a distance between the first extension piece **6611** and the second extension piece **6631** on the same metal shell **66** is greater than a distance between the first side wall **661** and the third side wall **663**. Referring to FIGS. **37** and **38**, for a group of second conductive terminals **62** arranged in the manner of G**3**-S**2**-S**2**-G**4**, the second contact portion **621** of the third ground terminal G**3** includes a first notch **6216** adjacent to the second differential signal terminals. The first notch **6216** is used for receiving the first extension piece

6611. The second contact portion **621** of the fourth ground terminal G**4** includes a second notch **6217** adjacent to the second differential signal terminals. The second notch **6217** is used for receiving the second extension piece **6631**. In the illustrated embodiment of the present disclosure, taking two adjacent pairs of second differential signal terminals sharing one fourth ground terminal G**4** as an example, two sides of the fourth ground terminal G**4** respectively include second notches **6217** facing different second differential signal terminals, and the second notches **6217** are used for mating with two adjacent metal shells **66**.

In the illustrated embodiment of the present disclosure, the third metal shield **63** and the fourth metal shield **64** are symmetrically disposed on both sides of the second insulating frame **61**. Referring to FIGS. **36** and **41**, the third metal shield **63** includes a third main body portion **631**, a third extension portion **632** extending from the third main body portion **631**, and a first elastic arm **634** and a second elastic arm **635** which are respectively located on two sides of the third extension portion **632**. The first elastic arm **634** and the second elastic arm **635** extend beyond the third main body portion **631** to contact the third ground terminal G**3** and the fourth ground terminal G**4**, respectively. The third main body portion **631** is located on one side of the second connection portion **623** of the second conductive terminal **62**. In the illustrated embodiment of the present disclosure, the third extension portion **632** and the third main body portion **631** are located in different planes, in which the third extension portion **632** is farther away from the fourth metal shield **64** than the third main body portion **631**. The third main body portion **631** includes a plurality of third mounting holes **6311** for mating with the plurality of third posts **6161**. The third posts **6161** are fixed to the third mounting holes **6311** by soldering. The third main body portion **631** includes a plurality of ribs **633**. The ribs **633** include a plurality of fifth ribs **6331** protruding toward the third ground terminal G**3** and a plurality of sixth ribs **6332** protruding toward the fourth ground terminal G**4**. The fifth ribs **6331** are disposed along an extending direction of the second connection portion **623** of the third ground terminal G**3**. The sixth ribs **6332** are disposed along an extending direction of the second connection portion **623** of the fourth ground terminal G**4**. In the illustrated embodiment of the present disclosure, the fifth ribs **6331** and the sixth ribs **6332** are formed by stamping the third main body portion **631**. The fifth ribs **6331** and the sixth ribs **6332** protrude toward the fourth metal shield **64**. The fifth ribs **6331** and the sixth ribs **6332** are disposed discontinuously along the extending direction of the second connection portion **623** of the third ground terminal G**3** and the extending direction of the second connection portion **623** of the fourth ground terminal G**4**, respectively, so as to achieve multi-position contact. Therefore, the reliability of the contact between the third metal shield **63** and the third ground terminals G**3** and the fourth ground terminals G**4** is improved. In the illustrated embodiment of the present disclosure, a wall thickness of the fifth rib **6331**, a wall thickness of the sixth rib **6332**, and a wall thickness of a portion of the third main body portion **631** located between the fifth rib **6331** and the sixth rib **6332** are the same.

In addition, the third main body portion **631** further includes a plurality of third protruding pieces **6312** extending downwardly from a bottom edge thereof and a plurality of connecting pieces **6313** each of which is located between two adjacent third protruding pieces **6312**. By providing the third protruding pieces **6312**, the shielding length can be extended, and the shielding effect on the second signal terminals S**2** can be improved. In the illustrated embodiment of the present disclosure, the connecting pieces **6313** are stamped from the third main body portion **631**. The connecting piece **6313** straddles the corresponding slot **6231** to connect one side of the first end portion **6232** and the second end portion **6233** of the same third ground terminal G**3**, thereby improving the shielding effect. At the same time, the connecting piece **6313** can also connect one side of the first end portion **6232** and the second end portion **6233** of the same fourth ground terminal G**4**, thereby improving the shielding effect.

In the illustrated embodiment of the present disclosure, there are multiple third extension portions **632** which are disposed at intervals. The third extension portions **632** are used to be inserted into the first slots **6612** and the second slots **6632** of the metal shell **66** to achieve contact and improve the shielding effect.

Similarly, referring to FIGS. **30**, **36** and **42**, the fourth metal shield **64** includes a fourth main body portion **641**, a fourth extension portion **642** extending from the fourth main body portion **641**, and a third elastic arm **644** and a fourth elastic arm **645** which are respectively located on both sides of the fourth extension portion **642**. The third elastic arm **644** and the fourth elastic arm **645** extend beyond the fourth main body portion **641** to contact the third ground terminal G**3** and the fourth ground terminal G**4**, respectively. The fourth main body portion **641** is located on the other side of the second connection portion **623** of the second conductive terminal **62**. In the illustrated embodiment of the present disclosure, the fourth extension portion **642** and the fourth main body portion **641** are located in different planes, in which the fourth extension portion **642** is farther away from the third metal shield **63** than the fourth main body portion **641**. The fourth main body portion **641** includes a plurality of fourth mounting holes **6411** for mating with the plurality of fourth posts **6162**. The fourth posts **6162** are fixed and positioned in the fourth mounting holes **6411** by soldering. The fourth main body portion **641** includes a plurality of ribs **643**. The ribs **643** include a plurality of seventh ribs **6431** protruding toward the third ground terminal G**3** and a plurality of eighth ribs **6432** protruding toward the fourth ground terminal G**4**. The seventh ribs **6431** are disposed along the extending direction of the second connection portion **623** of the third ground terminal G**3**. The eighth ribs **6432** are disposed along the extending direction of the second connection portion **623** of the fourth ground terminal G**4**. In the illustrated embodiment of the present disclosure, the seventh ribs **6431** and the eighth ribs **6432** are formed by stamping the fourth main body portion **641**. The seventh ribs **6431** and the eighth ribs **6432** protrude toward the third metal shield **63**. The seventh ribs **6431** and the eighth ribs **6432** are disposed discontinuously along the extending direction of the second connection portion **623** of the third ground terminal G**3** and the extending direction of the second connection portion **623** of the fourth ground terminal G**4**, respectively, so as to achieve multi-position contact. Therefore, the contact reliability between the fourth metal shield **64** and the third ground terminals G**3** and the fourth ground terminals G**4** is improved. In the illustrated embodiment of the present disclosure, a wall thickness of the seventh rib **6431**, a wall thickness of the eighth rib **6432**, and a wall thickness of a portion of the fourth main body portion **641** located between the seventh rib **6431** and the eighth rib **6432** are the same. In an embodiment of the present disclosure, soldering is performed on the surfaces of the ribs **633** and the ribs **643** to solder the ribs **633** and the ribs **643** to the third ground terminals G**3** and the fourth ground terminals G**4**. For example, soldering is performed on the surfaces of the fifth ribs **6331**, the sixth ribs **6332**, the seventh ribs **6431** and the eighth ribs **6432** so that the fifth ribs **6331**, the sixth ribs **6332**, the seventh ribs **6431** and the eighth ribs **6432** are soldered to the third ground terminals G**3** and the fourth ground terminals G**4**. The soldering method is at least one of spot soldering, laser soldering and ultrasonic soldering.

In addition, the fourth main body portion **641** further includes a plurality of fourth protruding pieces **6412** extending downwardly from a bottom edge thereof, and a plurality of connecting pieces **6413** each of which is located between two adjacent fourth protruding pieces **6412**. By providing the fourth protruding pieces **6412**, the shielding length can be extended, and the shielding effect on the second signal terminals S**2** can be improved. In the illustrated embodiment of the present disclosure, the connecting pieces **6413** is stamped from the fourth main body portion **641**. The connecting piece **6413** straddles the corresponding slot **6231** to connect the first end **6232** and the other side of the second end **6233** of the same third ground terminal G**3** so as to improve the shielding effect. At the same time, the connecting piece **6413** can also connect the first end portion **6232** and the other side of the second end portion **6233** of the same fourth ground terminal G**4** so as to improve the shielding effect.

In the illustrated embodiment of the present disclosure, there are multiple fourth extension portions **642** which are disposed at intervals. The fourth extension portions **642** are used to be inserted into the first slots **6612** and the second slots **6632** of the metal shell **66** so as to achieve contact and improve the shielding effect.

Referring to FIGS. **44** and **45**, in the length of the second connection portion **623** of the second conductive terminal **62**, the fifth rib **6331** of the third metal shield **63** and the seventh rib **6431** of the fourth metal shield **64** are in contact with two opposite side surfaces of the second connection portion **623** of the third ground terminal G**3**, respectively. The sixth rib **6332** of the third metal shield **63** and the eighth rib **6432** of the fourth metal shield **64** are in contact with two opposite side surfaces of the second connection portion **623** of the fourth ground terminal G**4**, respectively. As a result, a shielding cavity **67** surrounding the outer periphery of the second connection portion **623** of each pair of second differential signal terminals is formed. In the illustrated embodiment of the present disclosure, the fifth rib **6331** and the seventh rib **6431** contact the first wide surface **621***a* of the second connection portion **623** of the third ground terminal G**3**, respectively. The sixth rib **6332** and the eighth rib **6432** contact the second wide surface **621***c* of the second connection portion **623** of the fourth ground terminal G**4**, respectively. In the illustrated embodiment of the present disclosure, the shielding cavity **67** is formed by the third main body portion **631**, the fourth main body portion **641**, the third ground terminal G**3** and the fourth ground terminal G**4**. The second connection portion **623** of the third ground terminal G**3** includes a third tab portion **6234** extending into the shielding cavity **67**. The second connection portion **623** of the fourth ground terminal G**4** includes a fourth tab portion **6235** extending into the shielding cavity **67**. The second connection portions **623** of the second differential signal terminals are located between the third tab portion **6234** and the fourth tab portion **6235**. In the illustrated embodiment of the present disclosure, there are a plurality of shielding cavities **67** which are disposed along an arrangement direction of each group of the second conductive terminals **62**. Two adjacent shielding cavities **67** share a single third ground terminal G**3** or a single fourth ground terminal G**4**. Taking the shared third ground terminal G**3** as an example, a part of the shared third ground terminal G**3** protrudes into one shielding cavity **67**, and another part of the shared third ground terminal G**3** protrudes into another shielding cavity **67**.

At a position adjacent to the second contact portion **621** of the second conductive terminal **62**, the third extension portion **632** and the fourth extension portion **642** are both inserted into the first slot **6612** and the second slot **6632** of the metal shell **66**. The first extension piece **6611** and the second extension piece **6631** of the metal shell **66** are respectively inserted into the first notch **6216** of the third ground terminal G**3** and the second notch **6217** of the fourth ground terminal G**4**. At the same time, the first elastic arm **634** of the third metal shield **63** and the third elastic arm **644** of the fourth metal shield **64** clamp both sides of the second contact portion **621** of the third ground terminal G**3**. The second elastic arm **635** of the third metal shield **63** and the fourth elastic arm **645** of the fourth metal shield **64** clamp both sides of the second contact portion **621** of the fourth ground terminal G**4**. Specifically, the first elastic arm **634** and the third elastic arm **644** clamp the first wide surface **621***a* of the third ground terminal G**3**. The second elastic arm **635** and the fourth elastic arm **645** clamp the second wide surface **621***c* of the fourth ground terminal G**4**. With this arrangement, the third metal shield **63**, the fourth metal shield **64**, the metal shell **66**, the third ground terminal G**3**, and the fourth ground terminal G**4** are all connected in series, thereby the shielding area is increased and the shielding effect is improved.

In the illustrated embodiment of the present disclosure, there are multiple second wafers **6** of the second backplane connector **200**, and the terminal arrangement of two adjacent second wafers **6** are staggered. Correspondingly, the shielding cavities **67** of two adjacent second wafers **6** are also staggered. When the second wafer **6** is assembled to the second header **5**, the metal shell **66** of the second wafer **6** passes through the corresponding second terminal receiving groove **511** so as to extend into the receiving space **535**.

Referring to FIGS. **28** and **29**, in the illustrated embodiment of the present disclosure, the second spacer **7** is made of metal material or insulating material. The second spacer **7** includes a body portion **71** and a protruding piece **72** extending from the body portion **71**. The body portion **71** includes a plurality of slots **711** corresponding to the first protrusions **6111**. The protruding piece **72** includes a plurality of slits **721**, so that the protruding piece **72** is roughly comb-shaped. Each slot **711** is a closed slot, which means the circumference of the slot **711** is surrounded by the body portion **71**. The slit **721** is a non-closed slit, which means one end of the slit **721** is opened. The slit **721** is in alignment with the corresponding slot **711** along the vertical direction. Each slot **711** includes a first slot **7111** and a second slot **7112** of which a width is greater than that of the first slot **7111**. The first slot **7111** is located at one side of the second slot **7112** and communicates with the corresponding second slot **7112**. The slit **721** is located on the other side of the second slot **7112**.

When assembling the second spacer **7** to the plurality of second wafers **6**, firstly, the second slots **7112** of the second spacer **7** are corresponding to the first protrusions **6111** along the extending direction of the second contact portion **621**, and make the first protrusions **6111** pass through the second slots **7112**. Then, the second spacer **7** is moved along the extending direction of the second tail portions **622**, so that the first constriction portions **6113** are tightly clamped in the first slots **7111**. As a result, all the second wafers **6** can be combined into a whole so as to prevent loosening and prevent the second wafers **6** from being separated from the second spacer **7** along the extending direction of the second contact portions **621**.

Referring to FIGS. **31** to **33**, the second mounting block **8** is similar in structure to the first mounting block **4**. The second mounting block **8** includes a plurality of first through holes **81** for allowing the second tail portions **622** of the third ground terminals G**3** to pass through, a plurality of second through holes **82** for allowing the second tail portions **622** of the fourth ground terminals G**4** to pass through, and a plurality of slots **83** for allowing the second tail portions **622** of the second signal terminals S**2** to pass through. For a group of second conductive terminals **62** arranged in the manner of G**3**-S**2**-S**2**-G**4**, the first through hole **81** and the second through hole **82** are located on opposite sides of the slot **83** and are in communication with the slot **83**. A width of the slot **83** is greater than a width of the first through hole **81** and a width of the second through hole **82**, so that the second tail portions **622** of the second differential signal terminals can be completely exposed in the slot **83**. The second mounting block **8** further includes a first abutting surface **831** located on one side of the slot **83** and a second abutting surface **832** located on the other side of the slot **83**. The first abutting surface **831** and the second abutting surface **832** are disposed opposite to each other. The third protruding piece **6312** of the third metal shield **63** and the fourth protruding piece **6412** of the fourth metal shield **64** are at least partially inserted into the slots **83**. In the illustrated embodiment of the present disclosure, the third protruding piece **6312** of the third metal shield **63** abuts against the first abutting surface **831**. The fourth protruding piece **6412** of the fourth metal shield **64** abuts against the second abutting surface **832**. Along an arrangement direction of the group of second conductive terminals **62** arranged in the manner of G**3**-S**2**-S**2**-G**4**, the second tail portions **622** of the second differential signal terminals are located between the second tail portion **622** of the third ground terminal G**3** and the second tail portion **622** of the fourth ground terminal G**4**. Along the direction perpendicular to the arrangement direction, the second tail portions **622** of the second differential signal terminals are located between the third protruding piece **6312** of the third metal shield **63** and the fourth protruding piece **6412** of the fourth metal shield **64**. This arrangement improves the shielding effect of the second differential signal terminals. In an embodiment of the present disclosure, the second mounting block **8** is made of electroplated plastic so as to further improve the shielding effect.

Referring to FIG. **33**, the second mounting block **8** further includes a mounting wall **84** and a plurality of side walls **85** perpendicular to the mounting wall **84**. The side walls **85** are spaced apart and parallel to each other, and a plurality of slots **80** for insertion of the second wafers **6**. Each slot **80** is formed between two adjacent side walls **85**. A top of the side wall **85** includes a second inclined surface **851** communicating with the slot **80** and acting as an insertion guide. The second inclined surfaces **851** of the two side walls **85** located on opposite sides of the slot **80** have different inclination directions so as to form a bell-mouth opening. The bell-mouth opening is used to facilitate the insertion of the second wafers **6** or to facilitate to mount the second mounting block **8** to the second wafers **6**. An inner side of the side wall **85** also includes a plurality of positioning grooves **852** communicating with the slot **80** and used for positioning the third posts **6161** and the fourth posts **6162** which are located on the second bottom wall **614** of the second insulating frame **61**.

Referring to FIGS. **1**, **2**, **26** and **46** to **48**, when the first backplane connector **100** is mated with the second backplane connector **200**, the first header **1** of the first backplane connector **100** is inserted into the receiving space **535** of the second header **5** of the second backplane connector **200**. The metal shells **66** of the second wafers **6** of the second backplane connector **200** are inserted into the shielding spaces **27** of the first wafers **2** of the first backplane connector **100**. At this time, the positioning protrusions **14** of the first header **1** are received in the positioning grooves **530** of the second header **5**. The first elastic pieces **2323** of the first metal shields **23** and the second elastic pieces **2423** of the second metal shields **24** of the first backplane connector **100** contact the corresponding first side wall **661** and the corresponding third side wall **663** of the metal shells **66** of the second backplane connector **200**. The first contact portions **221** of the first wafers **2** are inserted into the mating holes **6215** of the second wafers **6** so as to make contact with the second contact portions **621**.

Referring to FIG. **49**, for each group of first conductive terminals **22** arranged in the manner of G**1**-S**1**-S**1**-G**2**, the first circuit board **301** includes two first insertion holes **301***a* for mating with the first tail portions **222** of the first differential signal terminals, a second insertion hole **301***b* for mating with the first tail portion **222** of the first ground terminal G**1**, and a third insertion hole **301***c* for mating with the first tail portion **222** of the second ground terminal G**2**. The second insertion hole **301***b* and the third insertion hole **301***c* are respectively located on two sides (for example, a left side and a right side) of the first insertion holes **301***a*. The first circuit board **301** also includes a plurality of grounding points **301***d* distributed on the periphery of the first insertion holes **301***a* and located between the outer edges of the second insertion hole **301***b* and the third insertion hole **301***c*. The grounding point **301***d*, together with the second insertion hole **301***b* and the third insertion hole **301***c*, form a shielding layer **301***e* surrounding the periphery of the first insertion holes **301***a*. In the illustrated embodiment of the present disclosure, the grounding points **301***d* may be connected through conductive paths of the first circuit board **301** so as to improve the shielding effect. Of course, in other embodiments, the grounding points **301***d* are discrete points and are not physically connected to each other. However, these grounding points **301***d* may also form the shielding layer **301***e* by coupling. Specifically, the second insertion hole **301***b* is disposed on one side (for example, the left side) of the two first insertion holes **301***a*. The third insertion hole **301***c* is disposed on the other side (for example, the right side) of the two first insertion holes **301***a*. The two first insertion holes **301***a*, the second insertion hole **301***b* and the third insertion hole **301***c* are disposed along the same baseline. The plurality of grounding points **301***d* are disposed on at least one side (for example, an upper side or a lower side) of the baseline. In the illustrated embodiment of the present disclosure, the plurality of grounding points **301***d* are located on the first side (for example, the upper side) and the second side (for example, the lower side) of the baseline. The baseline is located between the first side and the second side. The number of grounding points **301***d* located on the first side is greater than the number of grounding points **301***d* located on the second side. Specifically, the number of the grounding points **301***d* located on the first side is at least three. The number of the grounding points **301***d* located on the second side is at least two. In addition, the first circuit board **301** also includes a plurality of conductive wires **301***f*. The plurality of conductive wires **301***f* are electrically connected with the two first insertion holes **301***a*. The plurality of conductive wires **301***f* pass between at least two grounding points **301***d* on the second side.

In the illustrated embodiment of the present disclosure, the first tail portions **222** of the first differential signal terminals of the first backplane connector **100** pass through the first insertion holes **301***a* and are electrically connected to the first circuit board **301** by soldering. The first tail portion **222** of the first ground terminal G**1** passes through the second insertion hole **301***b* and is electrically connected to the first circuit board **301** by soldering. The first tail portion **222** of the second ground terminal G**2** passes through the third insertion hole **301***c* and is electrically connected to the first circuit board **301** by soldering.

Similarly, referring to FIG. **50**, for each group of second conductive terminals **62** arranged in G**3**-S**2**-S**2**-G**4**, the second circuit board **302** includes two first insertion holes **302***a* for mating with the second tail portions **622** of the second differential signal terminals, a second insertion hole **302***b* for mating with the second tail portion **622** of the third ground terminal G**3**, and a third insertion hole **302***c* for mating with the second tail portion **622** of the fourth ground terminal G**4**. The second insertion hole **302***b* and the third insertion hole **302***c* are respectively located on two sides of the first insertion holes **302***a*. The second circuit board **302** also includes a plurality of grounding points **302***d* distributed around the periphery of the first insertion hole **302***a* and located between the outer edges of the second insertion hole **302***b* and the third insertion hole **302***c*. The grounding point **302***d*, together with the second insertion hole **302***b* and the third insertion hole **302***c*, form a shielding layer **302***e* surrounding the periphery of the first insertion holes **302***a*. In the illustrated embodiment of the present disclosure, the grounding point **302***d* may be connected through conductive paths of the second circuit board **302** so as to improve the shielding effect. Of course, in other embodiments, the grounding points **302***d* are discrete points and are not physically connected to each other. However, these grounding points **302***d* may also form the shielding layer **302***e* by coupling. Specifically, the second insertion hole **302***b* is disposed on one side (for example, the left side) of the two first insertion holes **302***a*. The third insertion hole **302***c* is disposed on the other side (for example, the right side) of the two first insertion holes **302***a*. The two first insertion holes **302***a*, the second insertion hole **302***b* and the third insertion hole **302***c* are disposed along the same baseline. The plurality of grounding points **302***d* are disposed on at least one side (for example, the upper side or the lower side) of the baseline. In the illustrated embodiment of the present disclosure, the plurality of grounding points **302***d* are disposed on the first side (for example, the upper side) and the second side (for example, the lower side) of the baseline. The baseline is located between the first side and the second side. The number of grounding points **302***d* located on the first side is greater than the number of grounding points **302***d* located on the second side. Specifically, the number of the grounding points **302***d* located on the first side is at least three. The number of the grounding points **302***d* located on the second side is at least two. In addition, the second circuit board **302** also includes a plurality of conductive wires **302***f* The plurality of conductive wires **302***f* are electrically connected to the two first insertion holes **302***a*. The plurality of conductive wires **302***f* pass between at least two grounding points **302***d* on the second side.

In the illustrated embodiment of the present disclosure, the second tail portion **622** of the second conductive terminal **62** of the second backplane connector **200** includes a fisheye hole. The second tail portions **622** of the second differential signal terminals are pressed into the first insertion hole **302***a* to be electrically connected to the second circuit board **302**. The second tail portion **622** of the third ground terminal G**3** is pressed into the second insertion hole **302** *b* to be electrically connected to the second circuit board **302**. The second tail portion **622** of the fourth ground terminal G**4** is pressed into the third insertion hole **302***c* to be electrically connected to the second circuit board **302**.

The above embodiments are only used to illustrate the present disclosure and not to limit the technical solutions described in the present disclosure. The understanding of this specification should be based on those skilled in the art. Descriptions of directions, although they have been described in detail in the above-mentioned embodiments of the present disclosure, those skilled in the art should understand that modifications or equivalent substitutions can still be made to the application, and all technical solutions and improvements that do not depart from the spirit and scope of the application should be covered by the claims of the application.

What is claimed is:

1. A backplane connector assembly, comprising a first backplane connector and a second backplane connector mateable with the first backplane connector, the first backplane connector comprising a first wafer, the first wafer comprising:

- a plurality of first conductive terminals each comprising a first connection portion and a first contact portion;
- a first insulating frame, the first insulating frame being fixed with the first connection portion;
- a first metal shield, the first metal shield comprising a first extension portion; and
- a second metal shield, the second metal shield comprising a second extension portion;
- wherein the first conductive terminals comprise first differential signal terminals, a first ground terminal and a second ground terminal; and wherein the first differential signal terminals are located between the first ground terminal and the second ground terminal;
- the second backplane connector comprising a second wafer, and the second wafer comprising:
- a plurality of second conductive terminals each comprising a second connection portion and a second contact portion;
- a second insulating frame, the second insulating frame being fixed with the second connection portion;
- a third metal shield, the third metal shield comprising a third extension portion; and
- a fourth metal shield, the fourth metal shield comprising a fourth extension portion;
- wherein the second conductive terminals comprise second differential signal terminals, a third ground terminal and a fourth ground terminal; and wherein the second differential signal terminals are located between the third ground terminal and the fourth ground terminal;
- wherein the first extension portion comprises a first elastic piece, and the second extension portion comprises a second elastic piece;
- wherein the second contact portions of the second differential signal terminals extend beyond the third extension portion and the fourth extension portion, the second wafer comprises an insulating block sleeved on the second contact portions of the second differential

signal terminals and a metal shell sleeved on the insulating block, and the metal shell is in contact with the third extension portion and the fourth extension portion; and

wherein when the first backplane connector is mated with the second backplane connector, the first contact portions are in contact with the second contact portions, and the first elastic piece and the second elastic piece are respectively in contact with the metal shell.

2. The backplane connector assembly according to claim **1**, wherein the first extension portion comprises a first bulge protruding toward the first ground terminal, and a second bulge protruding toward the second ground terminal;

the second extension portion comprises a third bulge protruding toward the first ground terminal and a fourth bulge protruding toward the second ground terminal;

the first bulge and the third bulge respectively contact opposite side surfaces of the first contact portion of the first ground terminal, and the second bulge and the fourth bulge respectively contact opposite side surfaces of the first contact portion of the second ground terminal;

wherein the first extension portion, the second extension portion, the first ground terminal and the second ground terminal jointly form a shielding space which surrounds the first contact portions of the first differential signal terminals; and

wherein the metal shell is at least partially received in the shielding space.

3. The backplane connector assembly according to claim **2**, wherein the first connection portions of the first differential signal terminals, the first connection portion of the first ground terminal and the first connection portion of the second ground terminal are located in a first plane;

wherein the first ground terminal comprises a first torsion portion which connects the first connection portion of the first ground terminal and the first contact portion of the first ground terminal;

wherein the second ground terminal comprises a second torsion portion which connects the first connection portion of the second ground terminal and the first contact portion of the second ground terminal; and

wherein the first contact portion of the first ground terminal and the first contact portion of the second ground terminal are parallel and perpendicular to the first plane.

4. The backplane connector assembly according to claim **3**, wherein the first contact portion of the first ground terminal comprises two first wide surface and two first narrow surface; the first contact portion of the second ground terminal comprises two second wide surface and two second narrow surface; the first bulge and the third bulge contact the first narrow surfaces of the first ground terminal, respectively; and the second bulge and the fourth bulge contact the second narrow surfaces of the second ground terminal, respectively.

5. The backplane connector assembly according to claim **1**, wherein the first metal shield comprises a first main body portion connected to the first extension portion, the first main body portion comprises a first rib protruding toward the first ground terminal and a second rib protruding toward the second ground terminal;

wherein the second metal shield comprises a second main body portion connected to the second extension portion, the second main body portion comprises a third rib protruding toward the first ground terminal and a fourth rib protruding toward the second ground terminal; and

wherein the first rib and the third rib respectively contact opposite side surfaces of the first connection portion of the first ground terminal, the second rib and the fourth rib respectively contact opposite side surfaces of the first connection portion of the second ground terminal, and the first main body portion, the second main body portion, the first ground terminal and the second ground terminal jointly form a shielding cavity surrounding the first connection portions of the first differential signal terminals.

6. The backplane connector assembly according to claim **1**, wherein the insulating block comprises a mating surface and two through holes extending through the mating surface, the two through holes are adapted to receive the second contact portions of the second differential signal terminals, and the second contact portions of the second differential signal terminals comprise a mating hole to receive the first contact portions of the first differential signal terminals.

7. The backplane connector assembly according to claim **6**, wherein the second contact portions of the second differential signal terminals comprise a first contact section, a second contact section, and a slot located between the first contact section and the second contact section; and

Wherein the slot is in communication with the mating hole.

8. The backplane connector assembly according to claim **1**, wherein the metal shell comprises a first side wall, a second side wall, a third side wall and a fourth side wall which are connected in sequence;

wherein the first side wall is opposite to the third side wall, and the second side wall is opposite to the fourth side wall; and

wherein the insulating block is fixed in the metal shell.

9. The backplane connector assembly of claim **8**, wherein each end of the first side wall, the second side wall, the third side wall and the fourth side wall comprises a deflection portion bent inwardly so as to form a constriction portion at an end of the metal shell.

10. The backplane connector assembly according to claim **8**, wherein the metal shell further comprises a first extension piece extending and protruding from the first side wall and two first slots located on opposite sides of the first extension piece;

wherein the metal shell further comprises a second extension piece extending and protruding from the third side wall and two second slots located on opposite sides of the second extension piece; and

wherein the third extension portion and the fourth extension portion are inserted into corresponding first slots and corresponding second slots.

11. The backplane connector assembly according to claim **10**, wherein the first extension piece is in vertical contact with the second contact portion of the third ground terminal; and wherein the second extension piece is in vertical contact with the second contact portion of the fourth ground terminal.

12. The backplane connector assembly according to claim **10**, wherein the second contact portion of the third ground terminal comprises a first notch adjacent to the second differential signal terminals, and the first notch is adapted to receive the first extension piece; and

wherein the second contact portion of the fourth ground terminal comprises a second notch adjacent to the second differential signal terminals, and the second notch is adapted to receive the second extension piece.

13. The backplane connector assembly according to claim **8**, wherein the second side wall and the fourth side wall respectively comprise restriction protrusions which are stamped inwardly; and the restriction protrusions are mateable with the insulating block so as to prevent the insulating block from being drawn out of the metal shell.

14. The backplane connector assembly according to claim **8**, wherein the third metal shield comprises a third main body portion connected to the third extension portion, the third main body portion comprises a fifth rib protruding toward the third ground terminal and a sixth rib protruding toward the fourth ground terminal;

wherein the fourth metal shield comprises a fourth main body portion connected to the fourth extension portion, the fourth main body portion comprises a seventh rib protruding toward the third ground terminal and an eighth rib protruding toward the fourth ground terminal;

wherein the fifth rib and the seventh rib are respectively in contact with opposite side surfaces of the second connection portion of the third ground terminal, the sixth rib and the eighth rib are respectively in contact opposite side surfaces of the second connection portion of the fourth ground terminal, and the third main body portion, the fourth main body portion, the third ground terminal and the fourth ground terminal form a shielding cavity surrounding the second connection portions of the second differential signal terminals.

* * * * *